SIMULATION OF SHORT AND LONG FEEDER CATTLE HEDGING STRATEGIES AND TECHNICAL PRICE ANALYSIS OF THE FEEDER CATTLE FUTURES MARKET

By

JERRY DWAYNE LEHENBAUER

Bachelor of Science in Agriculture

Oklahoma State University

Stillwater, Oklahoma

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Thesis Approved:

John R. Franzmann

Thesis Adviser

Wayne D. Purcell

John E. Ikerd

Norman N. Durham

Dean of the Graduate College

PREFACE

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CHAPTER I

INTRODUCTION

Cattle prices have been trending downward since the sharp price break beginning in late 1973. During this time, cattle producers have experienced great uncertainty and financial risk. Large price fluctuations coupled with narrow profit margins have emphasized the importance and necessity of risk management if a cattle producer is to maintain a financially sound and profitable operation.

Faced with substantial risk, many decision makers began searching for methods to reduce the inherent price risk involved in producing cattle. As a result, there has been increased interest in the futures markets. Many cattle producers are becoming aware of the risk reducing potential of hedging and also are beginning to realize the advantages of hedging strategies that help determine whether and when to hedge.

The feeder cattle futures market can serve the risk management needs of both the feeder cattle producer and the cattle feeder. The feeder cattle producer can use this futures market for short hedging[1] his anticipated production of feeder cattle while the cattle feeder can

[1]A short feeder cattle hedge involves selling an amount of feeder cattle futures contracts equal to the anticipated production of feeder cattle.

use it to long hedge[2] his anticipated needs for feeder cattle. The feeder cattle futures market has been characterized by low trading volume, but the volume has significantly increased during the past two years (Table I). Use of this futures market for hedging is now feasible.

It is becoming more evident by early 1978 that the cattle price cycle has bottomed and several years of upward trending prices lie ahead. The January 1, 1978, U. S. cattle inventory figures show the total cattle inventory down 5 percent from 1977 and 9 percent from 1976. Beef cow numbers have declined even more, decreasing 6 percent from 1977 and 12 percent from 1976. Heifers for beef cow replacement are down 11 percent and 19 percent, respectively, compared with 1977 and 1976.

Even though it is apparent cattle prices will be climbing higher in the future, price risk will not be eliminated. In some respects, the risk will be even greater since the feeder cattle producer and the cattle feeder can expect to incur higher operating costs in the form of higher prices for stocker calves and feeder cattle, respectively.

In addition, cattle prices will continue to be volatile. Just as periods of rising cattle prices have occurred since the sharp price decline in late 1973 (Figure 1), there will also be periods of falling prices during the upward phase of the cattle price cycle. The short hedge will still be used, but more expertise will be required to obtain

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[2]A long feeder cattle hedge involves buying an amount of feeder cattle futures contracts equal to the anticipated needs for feeder cattle.

TABLE I

MONTHLY FEEDER CATTLE FUTURES VOLUME, 1971-1977

	1971	1972	1973	1974	1975	1976	1977
Jan.	---	873	1,899	1,279	1,680	2,300	7,584
Feb.	---	318	1,242	1,682	1,548	2,801	8,301
Mar.	---	352	2,936	1,433	2,212	3,421	10,972
Apr.	---	265	1,930	2,014	2,164	4,814	15,453
May	---	476	1,581	2,298	2,336	4,000	11,241
June	---	460	1,239	4,179	3,890	3,504	11,660
July	---	477	3,274	4,715	3,813	6,735	11,104
Aug.	---	387	3,367	4,662	2,590	4,784	12,603
Sept.	---	789	2,091	3,237	2,746	11,158	11,097
Oct.	---	726	1,874	2,720	2,184	9,901	11,295
Nov.	106	936	793	1,605	2,069	6,113	11,029
Dec.	414	1,398	620	1,175	2,355	3,264	10,935
Total	520	7,457	22,846	30,999	29,587	62,795	133,274

Source: Chicago Mercantile Exchange (1977).

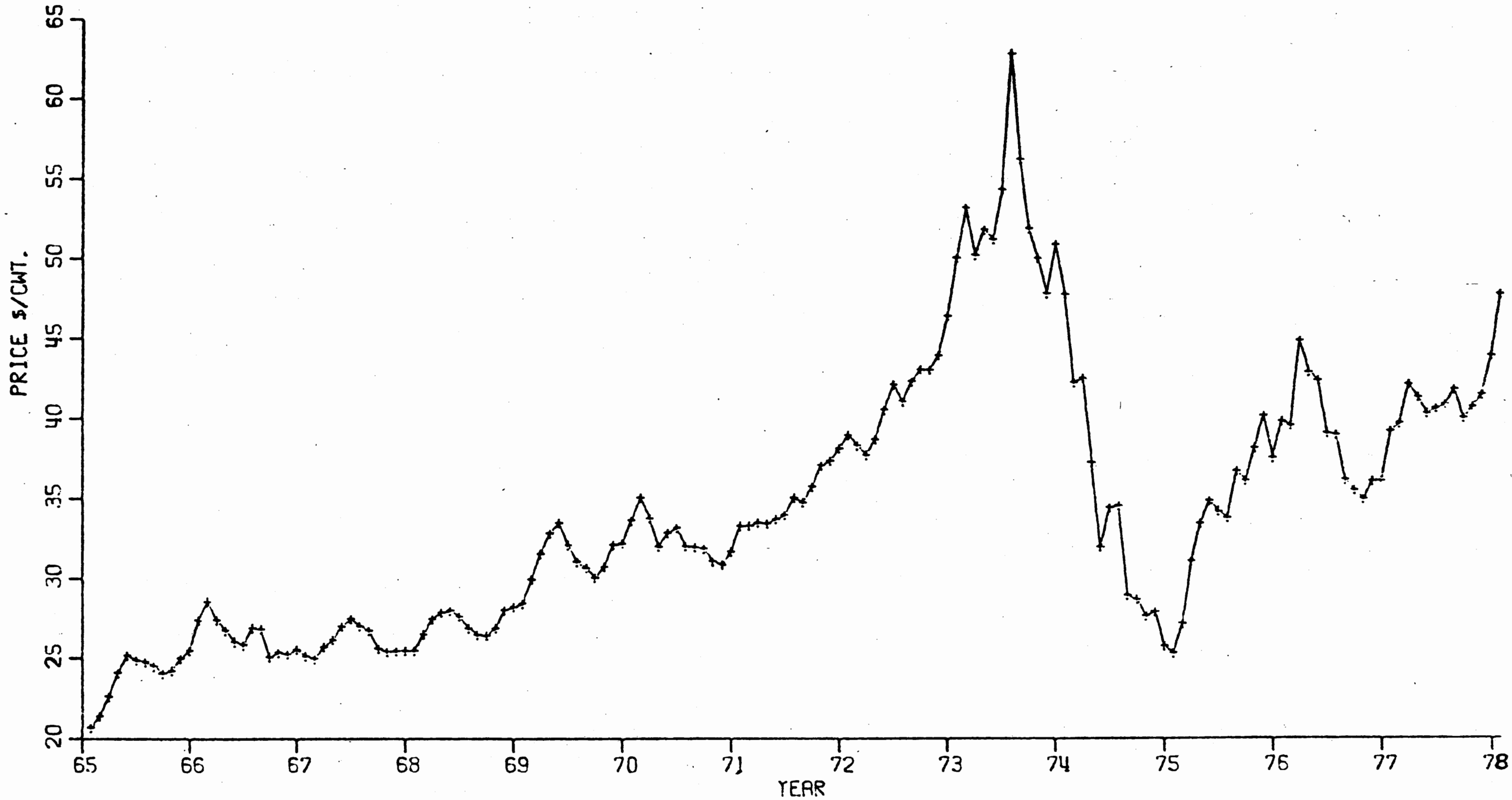

Figure 1. Choice 600-700 Pound Feeder Steer Price, Oklahoma City, 1965-February, 1978

the desired results from its use. Selective short hedging strategies will be needed to protect against the short run price declines.

Upward trending prices present new opportunities for the long hedge by cattle feeders. Several factors contribute to its potential use. The completion of the liquidation phase of the cow herd will result in reduced supplies of fed cattle. Decreased supplies of beef will result in higher fed cattle prices. Cattle feeders will have the incentive to bid up the price on the limited supplies of feeder cattle.

The feed grain situation is another contributing factor. Large inventories of feed grains have caused grain prices to fall, reducing the cost of gain for cattle feeders. This gives added incentive to bid up the price of feeder cattle.

Summing up, these fundamentals point to increased demand and higher prices for feeder cattle. In the next few years, a long feeder cattle hedge may be more effective in reducing risk and uncertainty than a short live cattle hedge for the cattle feeder.

However, simply knowing the fundamentals and the long run outlook for price trends does not guarantee effective hedging programs. At times, prices seem to move in a direction opposite to the supply and demand fundamentals. Therefore, considerable merit exists in developing hedging strategies that will aid cattle producers in effectively managing risk. Since cattle producers as a group represent varying levels of understanding and ability concerning futures markets, an objective hedging tool is desirable.

The Problem

Feeder cattle prices have exhibited erratic behavior in recent years. This price volatility has increased the already substantial degree of risk faced by the U. S. feeder cattle producer and cattle feeder. It is possible to reduce this price risk by hedging on the feeder cattle futures market. For a feeder cattle producer or cattle feeder who ranks profit maximization high among his set of goals, the classical hedge, taking opposite but equal positions in the cash and feeder cattle futures market, may not give the desired results. A hedging strategy to reduce price risk and maximize profits requires optimal timing of the placement and lifting of a hedge. Determining the proper time to hedge is further complicated because the anticipation of reports, daily weather changes, or bunchy market receipts may cause the feeder cattle cash and futures markets to behave differently from each other at a given point in time. Improved analysis and hedging strategies are needed to help feeder cattle producers and cattle feeders determine the proper time to place and lift the hedge.

Hypotheses

1. Price analysis of the feeder cattle futures contracts, commonly called technical analysis, will assist the hedger in determining the optimum time to place and lift a hedge for feeder cattle.

2. Determination of the optimum time to place and lift a hedge will increase the hedger's profits and reduce his price risk.

Procedure

The general procedure is to technically analyze price movement in the feeder cattle futures market and develop tools which will aid the hedger in placing and lifting the hedge. This general objective can be divided into the following specific procedures:

1. To optimize point and figure charts for the feeder cattle futures market.

2. To optimize moving averages for the feeder cattle futures market.

3. To compare profitability and reduction in price risk against the unhedged strategy for the classical hedging strategy and hedging strategies based on point and figure charts and moving averages.

Literature Review

The feeder cattle futures market is little more than six years old, and formal research on this market and marketing strategies is very sparse. There have been a few studies dealing with hedging strategies for fed cattle. Other studies concerning futures markets have been more general and descriptive in nature. The more recent and relevant results will be discussed.

Futrell (1970) states that agricultural producers, in general, have relatively little background and knowledge about futures markets.

> Many have had very negative attitudes toward these markets, considering them something akin to gambling. Developing hedging interests from this group has required, and continues to require, substantial educational effort to increase understanding of futures markets and their particular application to the farm business (p. 843).

Peck (1975) analyzed the performance of the futures market in increasing returns to the egg producer. A portfolio approach was used which analyzed net returns to producers in conjunction with the amount of risk associated with each specific net return. Peck demonstrated that optimal hedging strategies reduced markedly the producer's exposure to unpredictable price variation. The use of futures markets stabilized producer returns and, when used in conjunction with cash price forecasts, increased producer's income and reduced the risk associated with the expected increased income. Peck suggested that additional work needs to be done with other commodities using this and other approaches.

Davis (1973) demonstrated that price forecasting techniques and measures of a stocker operator's risk profile can be effectively combined in a marketing decision model to reduce the risk associated with unfavorable price changes. Davis considered both buying and selling decision strategies. Within each of these two broad categories, three alternatives were evaluated involving the cash market, forward contracting, and the futures market. Davis felt that promising results could be obtained from additional research incorporating selective hedging strategies.

Holland, Purcell, and Hague (1972) concluded that marketing strategies involving hedging can be used successfully by the manager of cattle feeding operations. It was also pointed out that short hedging can be an efficient management tool even during periods of upward trending cattle prices. Results of this study suggested that hedging strategies are available which not only decrease the variability of net returns but also increase the mean net returns, something that is not usually expected. They added that further work, especially involving incorporation of more refined short run price projection techniques, would appear to be very promising.

McCoy and Price (1975) found that hedging strategies can be advantageously used by the feedlot operator. Several of the strategies tested resulted in greater average profits and less variance than the completely unhedged alternative. The effect on profits of not feeding cattle when hedging criteria so indicated were also analyzed. In no instances were profits greater for partial capacity versus full capacity.

Franzmann (1975) expressed the need for techniques that would help cattlemen determine the appropriate times to hedge cattle. He indicated that pertinent supply and demand fundamentals are necessary but not sufficient to obtain the best timing in the placement and lifting of hedges. It was suggested that producers utilize technical strategies in order to do a better job of selective hedging. Franzmann concluded, "Proper use of technical tools assures that the hedge is employed only when needed thereby adding to feedlot profits and reducing the threat of bankruptcy."

Williams (1973) states that technical tools such as charts are essential for successfully hedging feeder cattle. Williams indicated that charts are especially helpful in timing the hedge and placing the stops since they put price changes into perspective.

Working in the area of technical price analysis, Zieg and Kaufman (1974) determined the optimized parameters for point and figure charting for several commodities. They defined optimal as that combination of variables yielding the highest profit and reliability, with a weighting bias toward reliability. In most cases, the optimized parameters increased both cumulative net profits and the percent reliability. They felt that optimal values should be selected for each delivery month for each commodity, and that these values must be periodically re-evaluated. The optimized parameters for live cattle were reported as a 30 point box size with a three box reversal.

Reinfeld (1977) also conducted research involving optimization of point and figure charts. The September, 1974, copper contract was analyzed. He felt that selection of optimized parameters based on only one box size and reversal number was "undependable--that luck and chance selection may have played a more important role than precision" (p. 36). Reinfelt argued that selection of parameters based on two or more box sizes and reversal numbers giving the same product when multiplied together would give more dependable results. It was also pointed out that using a too small box size and/or reversal number will be more apt to result in a loss than larger ones.

Purcell (1977) stated that a "hedge everything" strategy in an upward trending market negates the benefits of the higher cash prices. To hedge effectively, a selective approach is needed which will offer protection against price breaks and still allow all or part of the benefits of a rising cash market. Purcell suggested a technical tool, such as moving averages, to help call turning points in the markets. The performance of four selected moving average strategies for placing short hedges were reported for the live cattle futures market from 1965 through 1976. The 5 and 15-day moving average strategy with a 4-day linearly weighted moving average resulted in the highest net profit after commissions. It was noted that the 4-day linearly weighted moving average serves as a lead indicator and reduces some of the false signals.

Brown (1977) compared alternative short hedging strategies for feeder cattle based upon both technical price analysis and price predictions from econometric models. Average returns were the highest for a selective hedging strategy based only upon 5 and 10-day moving averages. Strategies incorporating the price predictions from the model resulted in both smaller mean returns and larger standard deviations of returns when compared with the 5 and 10-day moving average strategy.

Selective long hedging of feeder cattle using moving averages was tested by Purcell (1978). Ninety and 180-day planning periods were used during the test period from January, 1972, through November, 1977. For both the 90 and 180-day planning periods, the 5-day, 10-day, and 4-day linearly weighted moving average strategy resulted in the highest net futures profits per head of \$11.47 and \$20.12, respectively. Purcell (1978, p. J-1) stated, "Effective use of the long hedge can make significant contributions to the profit position of the cattle feeder."

CHAPTER II

THEORETICAL CONSIDERATIONS OF COMMODITY FUTURES PRICES AND SELECTIVE HEDGING

Analysis of the fundamental laws of supply and demand is commonly used to estimate the changes in prices of commodity futures markets. However, these predictions are not always very accurate. There are times when futures price movements appear to behave differently from the manner suggested by the analysis of supply and demand fundamentals. Anticipation of market reports, daily weather changes, or market rumors may cause substantial price changes in commodity futures prices even though there has been little or no change in the supply and demand fundamentals. Therefore, simply knowing which way prices will likely be trending over time does not guarantee an effective hedging program.

Another approach used to determine changes in commodity futures prices is technical price analysis. It is a study of the market prices rather than the fundamental factors affecting the supply and demand for a given commodity. Technical price analysis is based on the assumption that analysis of past price behavior is useful in determining future price behavior. By its very nature, technical price analysis implies that price fluctuations are not random nor unpredictable. This is direct opposition with the random walk theory, proclaimed by many as the true theory of commodity price behavior. Support for and evidence against the random walk theory can be found in recent research results.

No definite conclusion has yet been determined. However, due to the implications of using technical price analysis (such as point and figure charts and moving averages) to develop selective hedging strategies, it should prove beneficial to explore the existing knowledge concerning the random walk theory.

The theory of hedging itself is also far from being well established. Many would question whether placing and lifting the hedge several times during the production process is "true" hedging or if it is really a type of futures market speculation.

In this chapter, the theoretical considerations of commodity futures price behavior and selective hedging will be discussed. It should be pointed out, however, that no attempt will be made to present any new theories concerning these topics.

The Random Walk Theory

Agricultural commodities are well known for their price fluctuations. The random walk theory has evolved as an attempt to explain commodity price behavior in the futures markets. The premises behind this theory as well as results of several researchers who have conducted numerous tests will be reviewed and analyzed to determine the validity of this theory.

The random walk theory states that the best prediction of tomorrow's futures market price is today's futures market price, which rules out the possibility of any worthwhile price prediction (Cargill and Rausser, 1972). It implies that the use of charts or any mathematical device that attempts to predict future price changes by extrapolation of past price changes is worthless (Samuelson, 1965).

The model does not say that price changes are unpredictable if all available information is used; they are unpredictable using only previous price changes (Labys and Granger, 1970).

The random walk model views a commodity futures price series as a signal from a generating process inherent in the nature of the market under consideration (Cargill and Rausser, 1969). If P_t is the discrete price series generated by a random walk, then the following relation holds:

$$P_t - P_{t-1} = e_t$$

where e_t is a sequence of random, independent numbers with zero mean often termed white noise.[1] If this is a correct description of price behavior, prices should then proceed in a series of unpredictable, unconnected steps. This also implies that the price series cannot contain any cyclical or other deterministic components, such as a seasonal variation (Labys and Granger, 1970). However, seasonal and cyclical components are known to exist in cattle price series. This suggests that the random walk model is a cruder approximation to the truth for commodity price series with deterministic components (Labys and Granger, 1970).

A major premise of the random walk theory is the concept of an efficient market (Teweles, Harlow, and Stone, 1969). It is defined as a market with large numbers of equally informed, actively competing participants attempting to maximize profits. The market price reflects all information that is known as well as events that are expected to

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[1]The term white noise is used due to the analogy with the optical spectrum of white light, where all optical frequencies are present with the same intensity.

occur in the foreseeable future, and it adjusts rapidly to any new information. Even though disagreements will cause random discrepancies, actual prices will move randomly about the intrinsic value.

From the point of view of economic theory, independence of successive price changes implies a theoretically efficient commodity market (Smidt, 1965). Samuelson (1965) illustrated that the independence of successive price changes was consistent with the existence of an efficient market.

Although an efficient market has been shown to be theoretically sound, its actual existence is another issue. In an empirical study on corn futures prices, Larson (1960) found that over 80 percent of the change in corn prices due to new information occurred during the first day. This tends to support the concept of an efficient market. It should be noted, however, that all commodity futures markets might not be as efficient as the corn market.

Random walk theorists agree that their model probably does not exactly describe the behavior of commodity prices, but believe it is the best explanation of price behavior thus far (Teweles, Harlow, and Stone, 1969). They realize that while successive price changes may not be strictly independent, the amount of dependence is unimportant.

With a random walk model, the question of why trends exist must be explained. There are two basic ideas used to explain how an efficient market and trend can coexist.

The first is a risk-premium concept. Keynes (1930) assumed that a speculator who seeks to maximize profits will not become involved in a market in which his expected profit is zero. Hedgers offer the speculator a nonzero expectation in order to transfer risk. The risk-premium concept implies that price trends are a normal characteristic of all futures markets. This theory, however, assumes that speculators will only establish long positions in the futures markets.

A second explanation is advanced by Gray (1960) and is referred to as the "market-balance" concept. He states that a significant requirement for balance is enough participation by speculators to offset or balance the hedging. Although this concept does not concede that price trends are necessary, it views a trend as evidence of a market imperfection due to lack of sufficient speculation.

To summarize, the existence of a trend in futures prices would be interpreted by those who accept the risk-premium concept as simply the mechanism by which speculators earn a normal return; the same fact would be interpreted by those who accept the market-balance concept as indicative of insufficient mobility or barriers to entry.

In either case, the existence of a trend does not imply that the level of futures prices is anticipatory (Smidt, 1965). However, a price trend does not exclude the possibility that changes in futures prices might be reliably anticipated, in the sense that changes are mainly appropriate responses to new information.

Brinegar (1970) conducted a price trend study involving the corn, wheat, and rye futures markets. He reported that futures prices contain two general kinds of "non-ideal" behavior: (1) there is a clear continuity tendency in longer intervals, and (2) there is a slight reaction tendency in shorter intervals. Although only rough measures could be obtained, the reaction tendency appeared to have a time interval of 1 or 2 weeks, while the continuity tendency had a time interval somewhere between 4 and 16 weeks.

Brinegar's explanation for the tendency of longer intervals to exhibit continuity of movement conflicted with the results reported by Larson (1960) in his study of corn prices. Brinegar (1970) believed that although traders, as a group, may be doing their best to foresee the significance of all available information, their collective abilities may not measure up to the level required by an efficient market. Therefore, a continuity tendency is a result of the market only gradually accepting and acting upon new information, as opposed to the rapid, correct, and near unanimous evaluations required in an efficient market.

If the idea that an efficient market and the notion that a trend can coexist in an efficient market are accepted, then the theory of a random walk becomes a possible explanation of commodity price behavior. Several research studies have been conducted to test the validity of the random walk theory. These results will now be examined.

Houthakker (1961) conducted a study dealing with the profitability of stop loss orders as an indication of nonrandomness. He used corn and wheat futures prices in his analysis. In analyzing the stop percentages between 0 and 100, Houthakker cites some evidence of nonrandomness, but the improvement in profits was not always large. He concluded that a trader could not expect a stop loss strategy, per se, no matter how efficiently formulated, to result in a profitable trading strategy. On the basis of his results, he could not reject the random walk hypothesis.

Smidt (1965) tested a mechanical trading rule based on moving averages for soybeans. Profits from this trading rule were higher and more evenly distributed than for any other rule he had considered earlier. After showing that the observed profits would have been statistically unlikely if the price changes were not negatively correlated, Smidt concluded that price changes in the soybean futures market do not appear to behave in a random fashion.

Cargill and Rausser (1969) used spectral analysis to test the random walk hypothesis for three storeable commodities, wheat, corn, and oats, and one nonstoreable commodity, live beef cattle. Aside from a single exception, their results indicated that a very simply stochastic mechanism is consistent with the actual behavior of the daily futures prices for these actively traded commodities. They could not reject the random walk hypothesis.

They noted that futures markets are characterized by a large number of individuals continually predicting prices, in which the best predictive model assumes that the price at the next moment is the same as the present price plus a random element, i.e. a random walk. New information entering the market regarding weather conditions, spot prices, national income, or existing inventory levels would appear to emerge randomly and impart a similar random movement in futures prices.

Later, in 1972, Cargill and Rausser (1972) conducted a similar study but included more statistical procedures and added more commodities. Three approaches, serial correlation analysis, spectral density analysis, and integrated periodogram analysis were used to test the hypothesis of random walk behavior in the commodity futures markets. Nearly 170 futures contracts representing seven agricultural commodities and copper were used in the investigation. In each of the three tests, a substantial number of contracts appeared nonrandom. They rejected the random walk theory of price behavior and believed that the use of a larger number of contracts was the primary reason for obtaining different results in this study and their earlier one.

Cargill and Rausser (1975) did further research on this subject which included both statistical and mechanical testing procedures and a larger sample size. Simple and sophisticated tests of serial correlation were used on the daily price changes of 464 commodity contracts. Six agricultural commodities and copper were examined. Their results clearly showed that the random walk model must be rejected as a realistic description of commodity markets. They noted that both statistical and mechanical testing procedures should be used, but that the application of simple mechanical filters produced results which were difficult to assess on a statistical basis since probability statements could not be made as to whether generated profits were significantly different from what would be obtained by applying the same filter to a random series.

Stevenson and Bear (1970) applied various tests of probability distributions, serial correlations, and run analyses in addition to mechanical filters to test the validity of the random walk theory of corn and soybean futures markets. They concluded that the random walk theory did not offer a satisfactory explanation of these price series. Specifically, they found a tendency for negative dependence in short periods of time and positive dependence over longer periods of time. Not only were these characteristics recognizable, but also the long-term segments were profitable under certain mechanical trading rules throughout the period of the study, both in an absolute sense and with respect to a buy and hold policy.

They also validated the existence of long-term trends but stated this in itself did not contradict the random walk theory. However, the relatively high profitability of the long-term mechanical filters casted considerable doubt on the applicability of this theory in the commodity futures markets.

Leuthold (1972) investigated the short run fluctuations of the live beef cattle futures market. Spectral analysis indicated that a simple stochastic process was consistent with live beef cattle futures price behavior part of the time, but not at other times. He also used mechanical filters to test the same data. The results from these tests caused Leuthold to reject the idea that live beef cattle futures prices behave in random fashion.

In summary, current research findings using improved testing techniques and methods cast serious doubts concerning the random walk theory of commodity futures price behavior. Sufficient evidence has been found to support the idea that future price changes are dependent upon past price changes, and therefore, past prices may be reliable indicators of futures prices. Rejection of the random walk theory permits explanations of price behavior which seem closer to reality than the risk-premium or market-balance concepts. The concept of an efficient market is no longer necessary to explain actual market behavior, which implies a more gradual acceptance of information as opposed to rapid, nearly unanimous interpretations of new information.

Rejection of the random walk hypothesis permits charting, mathematical models, and other technical devices using past price information as methods to predict future price changes.

If the random walk theory is accepted, any attempt to use a selective hedging strategy based on technical price analysis should consistently result in decreased futures market profits when compared to the classical hedging strategy of taking a position and never changing it.

Now that the implications of technical price analysis have been explored, it needs to be determined if any justification exists for selective hedging strategies.

Objectives of Selective Hedging

Reduction of price risk has been the conventional purpose of hedging expressed in most of the economic literature, particularly in earlier writings (Hardy and Lyon, 1923; Stevens, 1929). If this is the sole purpose of hedging, no real decision making is required of the hedger. All he simply needs to do is take an opposite but equal position in the futures market from the time the production process begins until it ends. There would never be any reason or need to lift the hedge.

Working (1953a) was perhaps the first to formally express a different view of hedging. He felt that role of risk avoidance in most hedging had been greatly overemphasized in economic discussions. Instead, most hedging was done purely as logical reasoning from available information concerning prices and other economic factors rather than any desire to minimize risk. If the producer could afford to take the risk and was fairly confident of rising prices, Working could see no reason why the producer should want to hedge.

Working (1953b, p. 561) reaffirmed his position on hedging in another article. He stated that ". . . any curtailment of risk may be only incidental advantage gained, not a primary or even a very important incentive to hedging." He also added that when hedging is practiced systematically, there is no need to consider whether the absolute level of the price is favorable.

Gray (1961) also accepted Working's view that risk reduction is not an important motivating force in hedging in many cases. His viewpoint was based on the lack of adequate evidence supporting a risk premium in commodity futures prices.

Telser (1955) examined entrepreneurial behavior under uncertainty and its implications on hedging. He pointed out that an entrepreneur may choose to accept a higher degree of risk for a higher expected net profit.

This idea of a trade-off between risk and expected return for a hedger was also presented by Johnson (1960). He stated there was no distinction between the hedger and the "ordinary" speculator insofar as both are motivated by a desire to obtain an optimum combination of risk and expected return as determined by their respective utility functions. Other writers have also indicated that hedgers consider both expected returns and risks when making their hedging decisions (Cootner, 1967; Peck, 1975).

With these points in mind, it seems only natural that a hedger who is willing to substitute between risk reduction and expected return would formulate a selective hedging strategy rather than a "hedge and hold" strategy. He would want to place the hedge if he felt it was illogical to bear the price risk. Likewise, he would be willing to accept the price risk, i.e. lift the hedge, if he felt it was logical to do so.

In the remainder of this thesis, the theories and applications of technical price analysis and selective hedging will be combined to develop selective hedging strategies for feeder cattle.

CHAPTER III

OPTIMIZATION OF POINT AND FIGURE CHART PARAMETERS FOR THE FEEDER CATTLE FUTURES MARKET

Determining the proper time to place and lift hedges is a real problem for a feeder cattle producer or a cattle feeder whose primary goal is to obtain a more favorable price for feeder cattle. Point and figure charting is one potential method available for developing such a selective hedging strategy. Neither knowledge of econometric models and statistics nor sophisticated equipment is needed. The only data required is each day's high and low prices for the appropriate feeder cattle futures contract. With a little practice, nearly anyone can become a skilled point and figure chartist.

This chapter involves the optimization of point and figure chart parameters for feeder cattle. The first part of the chapter covers the point and figure charting technique itself. The procedure used to obtain the results is discussed in the next part, followed by a section in which the results are analyzed. The final part gives a summary of the entire chapter.

The Point and Figure Charting Technique

The only information needed for point and figure charting is the direction and magnitude of price changes. Unlike bar charts, this technique ignores trading volume and open interest, and the price changes are plotted independently of time. An excellent illustration and discussion on the mechanics of point and figure charting are given in Cohen (1972).

X's are used to plot upward moving prices while O's are used to plot downward moving prices. The vertical columns of X's and O's alternate. The plotting is moved one column to the right each time a price reversal occurs. X's and O's can never appear in the same column since each column represents either an upmove or a downmove; it cannot represent both. With this charting technique, daily highs and lows are used for determining changes in the price movement and not the closing prices.

To illustrate the construction of a point and figure chart, consider the price data in Table II relating to the May 1977 Feeder Cattle contract traded on the Chicago Mercantile Exchange. Using a piece of conveniently ruled graph paper, construct a price scale along the vertical axis corresponding to the box size chosen. This example will use a $.20 box size and a three box reversal.

Starting with April 7, place X's in the boxes representing $43.00, $43.20, $43.40, and $43.60 (Figure 2). Since the low of the day did not go to $42.80, no entry was made in this box; and since the daily high did not reach $43.80, no entry was made in that box.

On April 11 the high is checked to see if a new high was made since X's were plotted last. A new high of $43.92 was made so an X was entered in the $43.80 box. On April 12 neither a new high nor a new low was made so no entries were made on this date. A new high of $44.70 was made on the following day so four more X's were plotted up

TABLE II

PRICE DATA FOR THE MAY, 1977, FEEDER CATTLE CONTRACT, APRIL 7, 1977-APRIL 18, 1977, IN DOLLARS PER CWT.

Date	High	Low
April 7	43.67	42.90
8	Market Closed --	Good Friday
11	43.92	43.35
12	43.80	43.35
13	44.70	43.85
14	44.62	44.00
15	45.00	43.90
18	45.30	44.75

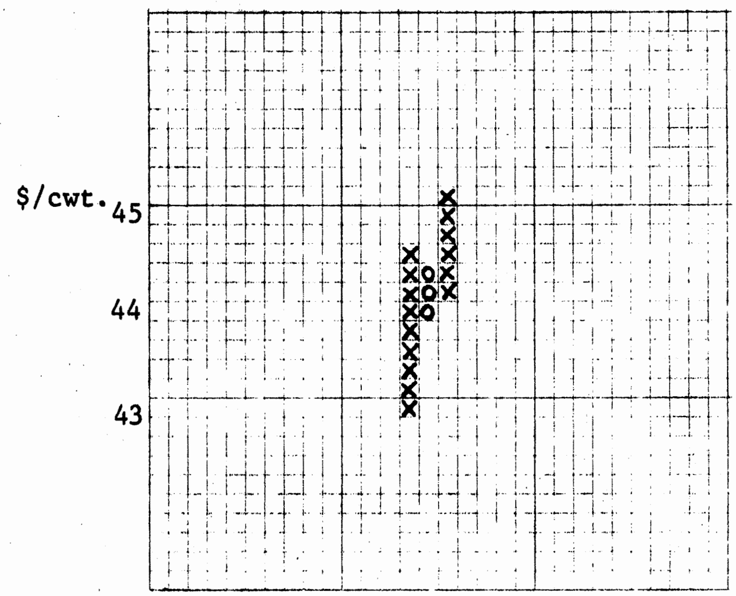

Figure 2. A $.20 x 3 Point and Figure Chart

through the \$44.60 box. The lows are ignored as long as X's are being plotted.

On April 14 the contract failed to make a new high. The low is then checked, and it is noted that the difference between the previous high plotted and the low price is (\$44.60 - \$44.00) = \$.60. This represents a change in direction of the trend of exactly the three box minimum. An entry is made in the form of O's one column to the right and one box below the highest box plotted so that three O's are entered.

On April 15 the low is checked and although a new low was made, it did not represent enough of a decrease to warrant a new entry. The high is then checked, and it represents a change in trend of more than three boxes, i.e. \$45.00-44.00 = \$1.00. Therefore, a new series of five X's are plotted one column to the right and one box above the last O entry. On April 18 the uptrend was continued and one more X was plotted in the \$45.20 box to depict the move to the new high of \$45.30.

Plotting of the price data continues in this manner for each day's data as long as the contract is traded, and can be summarized by the following rules:

1. If the last chart entry is an X, then look at the daily high. If the price has gone up, enter the additional X or X's and forget about the lows. If the price has not gone up enough to enter any X's, then look at the low price for a reversal.

2. If the last chart entry is an O, then look at the daily low. If the price has gone lower, enter the additional O or O's and forget about the highs. If the price has not gone down enough to enter any O's, then look at the high price for a reversal.

Procedure

The data set consisted of 18 feeder cattle futures contracts. The March, May, and October contracts were used, beginning with the 1972 contract year and ending with the 1977 contract year. These delivery months were selected as the most representative of all the delivery months due to their relatively high trading volumes.

Although many distinct point and figure chart formations exist, only the breakouts of double top and double bottom formations were recognized for the buy and sell signals (Figure 3). The size of the open position was limited to only one 42,000 pound contract for each delivery month at any point in time. Observation of the individual charts did not indicate any potential increases in net profits from honoring more complex formations. Also, the double top and double bottom formations are more easily recognized by inexperienced point and figure chartists.

The daily high and low prices were used in construction of the point and figure charts. This is the procedure normally used. A few tests were conducted using only the opening, high, low, or closing prices. However, none of these alternatives increased total net profits over the high-low price combination.

For this optimization process, optimal was defined as that combination of box size and reversal number yielding the highest profits for the entire set of 18 contracts, after charges for commission of \$50.00 per trade.[1] No charges were included for interest on margin money. This definition was considered to be the most consistent for a selective hedger with a primary objective of a more favorable price.

Each of eight box sizes from \$.05 to \$.40 in \$.05 multiplies was tested with reversal numbers from one to five inclusive. The \$.05

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[1]The commission fee of \$50.00 per trade was arbitrarily selected and will vary with the brokerage firm.

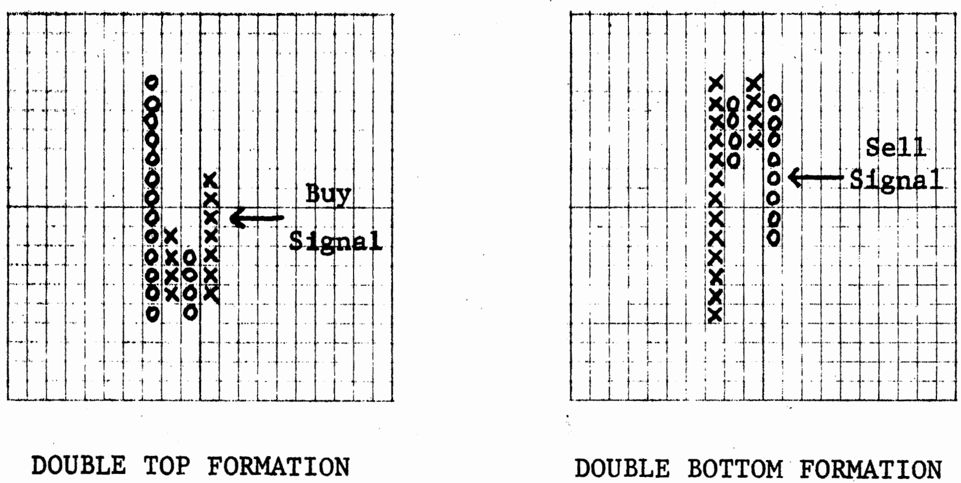


Figure 3. Formations for Buy and Sell Signals on Point and Figure Charts

box size was also tested with a six box reversal, giving a total of 41 different box size-reversal number combinations. Testing of additional parameter combinations did not appear promising.

To keep this simulation realistic, certain trading rules were imposed:

1. No trades were transacted on days when the high and low prices were equal, assuming no trading occurred for this contract on this day.

2. No trades were allowed when the transaction price was equal to a limit move price.

3. If the price range gapped above or below a buy or sell signal respectively, the closing price was used unless it was a limit move price. In such cases, no trades were transacted on this day.

4. Due to the threat of delivery, no new buy signals were honored after the first of the delivery month.

Use of these rules significantly decreased the amount of total net profit, especially for the contracts in 1973 and 1974 when limit moves occurred frequently.

Analysis of Results

Table III reports the results of the 41 different box size-reversal number combinations. The greatest total net profit occurred with a \$.05 box size and a five box interval. However, the top five ranking parameter combinations were relatively close, all having total net profits greater than \$54,000. Most of this profit was not the result of a single unusual year (Table IV). Many of the better parameter combinations had profits in excess of \$10,000 in three of the six years.

Reinfeld (1977) suggested that the selection of optimal parameters for point and figure charts should be based on the profits from more

TABLE III

NET PROFITS IN DOLLARS FROM THE FEEDER CATTLE FUTURES MARKET
USING POINT AND FIGURE CHARTS, 1972-1977

Box Size in $/cwt.	Reversal Distance in Boxes	Net Profits from Long Trades	Net Profits from Short Trades	Total Net Profits	Rank Based on Total Net Profits	Total Number of Trades	Percent Profitable Trades
.05	1	28,328	23,171	51,499	10	272	41.2
.05	2	28,906	24,001	52,907	8	262	41.6
.05	3	28,439	23,025	51,464	11	256	41.8
.05	4	30,348	25,257	55,605	3	245	43.3
.05	5	30,837	25,767	56,604	1	235	44.7
.05	6	29,895	24,405	54,300	5	229	44.5
.10	1	28,098	23,033	51,131	12	266	42.7
.10	2	29,108	23,913	53,021	6	245	43.7
.10	3	29,226	23,757	52,983	7	223	44.4
.10	4	26,212	21,950	48,162	15	214	44.4
.10	5	25,410	20,854	46,264	17	194	45.9
.15	1	30,457	25,616	56,073	2	251	45.0
.15	2	28,209	23,489	51,698	9	224	46.4
.15	3	25,143	20,220	45,363	18	199	45.7
.15	4	25,010	22,679	47,689	16	166	48.8
.15	5	20,129	19,179	39,308	25	140	47.1
.20	1	29,778	24,839	54,617	4	234	43.6
.20	2	26,667	22,320	48,987	13	198	44.9
.20	3	22,528	18,700	41,228	21	162	45.1
.20	4	19,995	20,502	40,497	23	119	47.9
.20	5	11,205	12,334	23,539	31	101	46.5

TABLE III (Continued)

Box Size in $/cwt.	Reversal Distance in Boxes	Net Profits from Long Trades	Net Profits from Short Trades	Total Net Profits	Rank Based on Total Net Profits	Total Number of Trades	Percent Profitable Trades
.25	1	24,255	19,859	44,114	20	235	43.8
.25	2	22,640	17,739	40,379	24	181	44.8
.25	3	20,296	17,406	37,702	27	135	47.4
.25	4	10,273	10,302	20,575	32	105	54.7
.25	5	5,938	10,007	15,945	33	79	46.8
.30	1	21,915	17,279	39,194	26	212	43.4
.30	2	24,153	20,941	45,094	19	146	46.6
.30	3	11,823	12,806	24,629	30	106	46.2
.30	4	3,859	6,681	10,540	35	81	44.4
.30	5	-5,455	423	-5,032	40	62	37.1
.35	1	22,893	18,319	41,212	22	184	45.1
.35	2	17,585	18,062	35,647	28	120	46.7
.35	3	4,197	8,804	13,001	34	90	43.3
.35	4	-810	5,366	4,556	36	63	44.4
.35	5	-8,326	-226	-8,552	41		37.5
.40	1	25,867	22,443	48,310	14	164	45.7
.40	2	14,722	12,146	26,868	29	108	48.1
.40	3	-4,050	2,281	-1,769	38	72	37.5
.40	4	-5,625	3,175	-2,450	39	48	39.6
.40	5	-2,260	3,005	745	37	37	35.1

TABLE IV

YEARLY DISTRIBUTION OF PROFITS IN DOLLARS FROM SELECTED POINT AND FIGURE CHART PARAMETERS, 1972-1977

Parameters	1972	1973	1974	1975	1976	1977	Average
.05x5	5,637	17,477	17,552	2,866	11,318	1,754	9,434
.15x1	4,177	14,846	19,878	-361	12,151	5,382	9,346
.40x1	3,099	12,710	16,554	4,908	13,263	-2,224	8,052
.20x3	2,973	14,283	16,512	3,745	8,333	-4,618	6,871

than one box size and reversal number combination. He used the average profit based on two or more parameter combinations having the same product of box size and reversal number (B x R) when multiplied together, e.g. the average profit of the \$.05 x 5 and the \$.25 x 1 parameter combinations. He also used the average profit of grouped parameter products, e.g. the average profit from a group of parameter combinations with a B x R product from \$.40 to \$.50. However, these techniques did not add any new information nor did they aid in selection of the optimized parameters for feeder cattle as shown in Figures 4 and 5.

Neither of these curves came close to resembling the normal curve hypothesized by Reinfeld (1977). The curve based on the average profits of two or more parameter combinations having the same B x R was downward sloping over the entire range of B x R values (Figure 4). The curve with the grouped B x R did not reach a maximum either although it did flatten out for grouped B x R values between \$.00 and \$.20 (Figure 5).

In general, for any given box size, net profits decreased as the reversal number increased (Table III). Also, out of the top 15 combinations, only one combination, the \$.40 x 1, had a box size greater than \$.20. Clearly, the better parameter combinations tended to be the ones having both a small box size and a small reversal number. As might be expected, these parameter combinations also produced a larger number of trades, but the percent of profitable trades was not noticeably affected. Even though the number of false signals was apparently increased, the small box sizes and reversal numbers generally resulted in a smaller loss for each of the false signals.

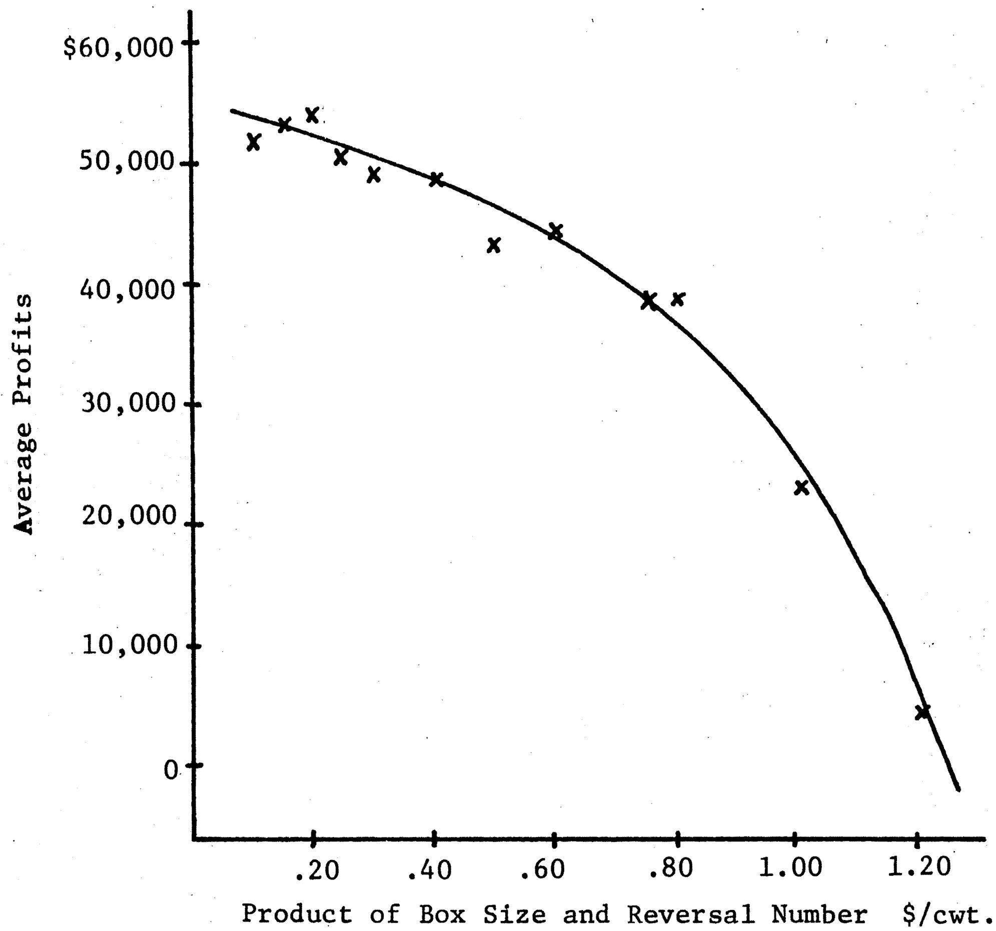


Figure 4. The Average Profit Curve of the Feeder Cattle Futures Market Based on Two or More Box Size and Reversal Number Combinations Having Equal Products, 1972-1977

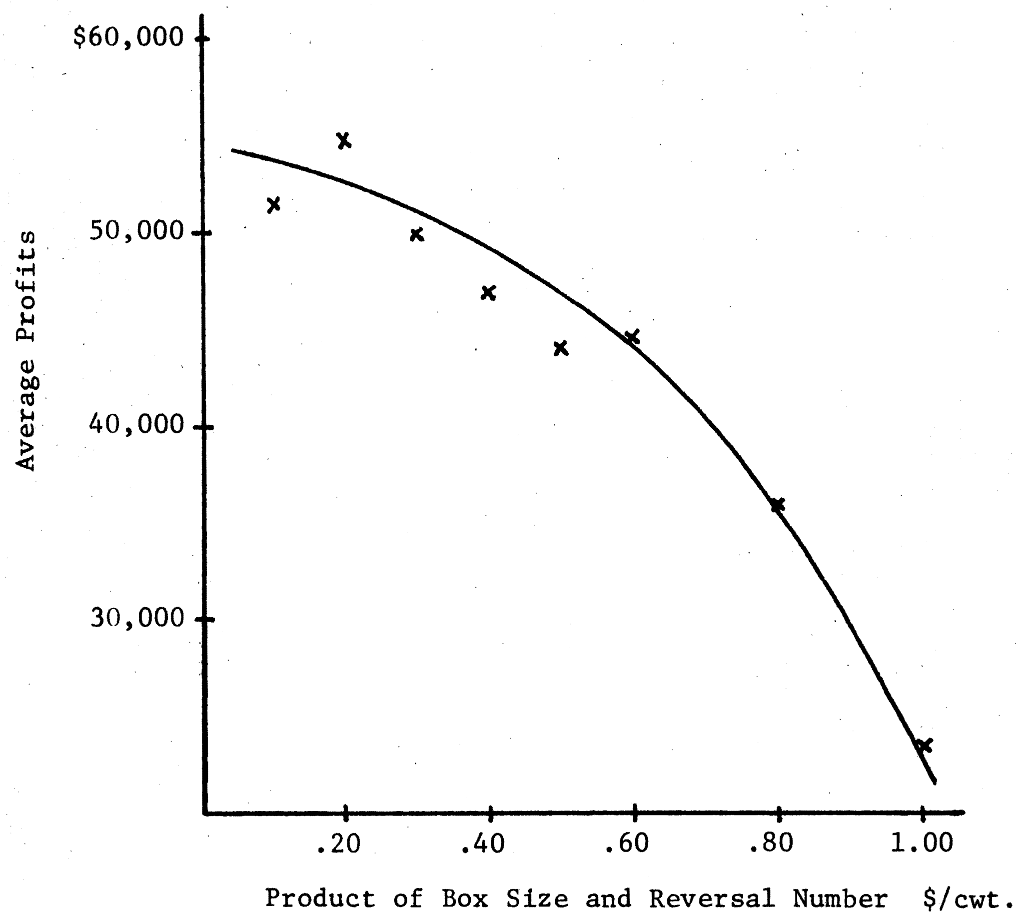


Figure 5. The Average Profit Curve of the Feeder Cattle Futures Market Based on the Product of Box Size and Reversal Number Grouped in $.10/cwt. Increments, 1972-1977

Net profits from long trades were greater than net profits from short trades for the better parameter combinations, even though the number of short and long trades were about equal. The reverse was true for those parameter combinations having low or negative total net profits.

None of the parameter combinations tested had high reliability as indicated by the percentage of profitable trades (Table III). An increase in the percent of profitable trades did not accompany those parameter combinations yielding higher total net profits. It seems that the percent of profitable trades is not a useful criterion for optimizing over long time periods.

The standard \$.20 box size and three box reversal commonly used for live cattle (Zieg and Kaufman, 1974) gave fair results. The \$.40 x 1 combination, used by at least one chart service for live cattle, had somewhat larger profits. However, many of the smaller box sizes and reversal numbers performed even better (Table III).

Zieg and Kaufman (1974) reported a \$.30 x 3 as being the optimal combination for live cattle. This parameter set performed rather poorly over the entire six year period for feeder cattle. However, it should be remembered that Zieg and Kaufman used only a 135 trading day period for their study.

Therefore, if a relatively short time span is used to optimize the parameters, it appears that the parameters need to be periodically re-optimized. Use of a longer time period seems to eliminate this need.

It was evident during the six year time period that larger box sizes and reversal numbers gave better results for some of the contracts.

For example, in 1975 both the \$.40 x 1 and the \$.20 x 3 chart parameters were definitely superior to either the \$.05 x 5 or the \$.15 x 1 (Table IV). An attempt was made to find a variable that would indicate when the parameters needed to be re-optimized. The two possibilities examined were the variance of the closing prices and the variance of the daily ranges between the high and low prices. Neither of these produced satisfactory results.

The main problem is finding a variable which indicates a need to change parameters before instead of after low profits have occurred. Re-optimizing parameters after a contract has produced low or negative profits does not guarantee that the new re-optimized parameters will work the best on the next contract. Furthermore, continual re-optimization would require access to a computer and involve considerable time and expense.

As mentioned earlier, parameters which kept the losses small on the losing trades produced the best results. This indicated that use of stops might prove helpful. Due to their ranking (Table II) or common use, the parameter combinations selected for testing with stops were the \$.05 x 5, \$.15 x 1, \$.20 x 1, \$.20 x 3, and \$.40 x 1. These results will now be discussed.

Results from Using an Ordinary Stop

Various sizes of stops were tested for each of the selected parameter combinations until a maximum total net profit was obtained. Whenever the price moved a specific amount against the entry price, the trade was "stopped out" at that specified price. For example, if a \$1.00 stop was specified and a long position was established at

$38.00, the position was automatically closed out at $37.00 if the price ever fell to $37.00 or lower. If the daily price range gapped above or below the stop price, then the closing price was used to close out the open position.

Incorporation of a stop increased total net profits for each of the selected parameter combinations except for the $.05 x 5 combination (Table V). In all cases, the most profitable size of stop resulted in a large percentage of the trades being stopped out. Use of the stop also increased the total number of trades. Another noticeable result was that most of the increase in total net profits was due to increased profits from the long trades. In fact, net profits from the short trades was decreased with some of the stops.

The $.20 x 3 combination was helped the most by use of the stop. Total net profits were increased by nearly $5,000 for a 12 percent increase using a $0.00 stop (Table V). A $0.00 stop meant that any time a price occurred after a three box reversal which resulted in a negative equity balance, the position was closed out.

No definite pattern was evident concerning the size of the optimal stops. For example, a $.30 stop was optimal for the $.15 x 1 parameter combination while a $.75 stop was optimal for the $.20 x 1 combination (Table V). Also, the effectiveness of the stop differed greatly among the selected parameter combinations tested.

Results from Using a Trailing Stop

The trailing stop was based on the top X plotted in each X column occurring after a buy signal and based on the lowest O plotted in each O column occuring after a sell signal. For example, assume a long

TABLE V

NET PROFITS IN DOLLARS FROM THE FEEDER CATTLE FUTURES MARKET USING POINT AND FIGURE CHARTS WITH STOPS, 1972-1977

Box Size in $/cwt.	Reversal Distance in Boxes	Size of Stop in $/cwt.	Net Profits from Long Trades	Net Profits from Short Trades	Total Net Profits	Total Number of Trades	Percent Profitable Trades	Percent of Trades Stopped Out
.05	5	.60	30,785	24,343	55,128	272	36.4	50.7
.05	5	.65	30,751	24,640	55,391[a]	267	37.1	48.7
.05	5	.70	30,901	24,446	55,347	262	38.2	46.6
.15	1	.25	36,126	23,274	59,400	317	33.4	64.0
.15	1	.30	35,131	24,657	59,788[a]	310	34.5	62.3
.15	1	.35	34,765	23,418	58,183	310	34.8	60.0
.20	1	.70	32,642	25,038	57,680	257	38.5	47.1
.20	1	.75	31,831	27,417	59,248[a]	251	39.4	43.8
.30	1	.80	31,788	26,473	58,261	250	39.6	43.2
.20	3	.00	27,154	18,866	46,020[a]	223	30.0	71.7
.20	3	.05	27,069	18,488	45,557	222	28.8	70.3
.20	3	.10	26,376	18,106	44,482	222	28.8	70.3
.40	1	1.10	27,436	24,469	51,905	173	42.2	39.9
.40	1	1.15	28,228	24,415	52,643[a]	171	42.7	37.4
.40	1	1.20	27,745	24,226	51,971	171	42.7	37.4

[a]Denotes maximum total net profits for each box size-reversal number combination.

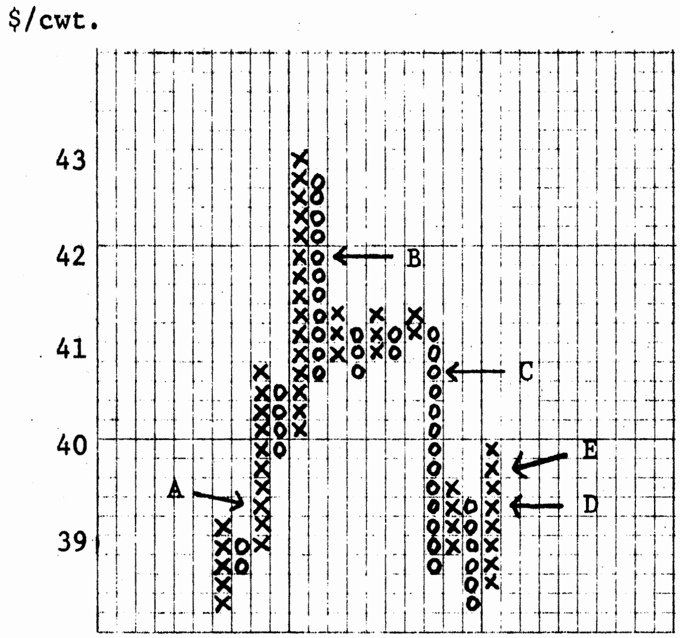
position was established at \$39.40 when a breakout of a double top formation occurred as shown by A in Figure 6. With a \$1.00/cwt. trailing stop, this position was automatically stopped out at \$42.00 as indicated by B in Figure 6 which is exactly \$1.00 lower than the value of the top X plotted in the preceding X column, i.e. \$43.00. With this trailing stop, it was possible for a trade to be stopped out with a positive profit.

The same parameter combinations selected for testing the ordinary stop were also used for testing the trailing stop. Use of the trailing stop increased the total net profits for each of the selected parameter combinations (Table VI) when compared with the total net profits in Table III. However, the only substantial increase in total net profits occurred with the \$.40 x 1 combination.

Generally, most of the increase in total net profits was due to increases in net profits from the short trades. This result was opposite that for the ordinary stop. One exception was the \$.40 x 1 combination which had considerably greater improvement in net profits from the long trades (Table VI).

The trailing stop also increased the total number of trades. A large percentage of these trades were stopped out using the optimal size of trailing stop, but the final total net profit figure was always increased. For example, total net profits for the \$.40 x 1 combination were increased by over \$9,000 even though 64 percent of the trades were stopped out with a \$1.45 trailing stop.

Unlike the ordinary stop, the optimal size of trailing stop fell within a rather narrow range of \$1.40 to \$1.50. Deviations of \$.05



A. Buy signal at $39.40
B. Long position stopped out at $42.00
C. Sell signal at $40.80
D. Short position stopped out at $39.40
E. Buy signal at $39.80

Figure 6. Example of a $1.00 Trailing Stop Used with a $.20 x 1 Point and Figure Chart

TABLE VI

NET PROFITS IN DOLLARS FROM THE FEEDER CATTLE FUTURES MARKET USING POINT AND FIGURE CHARTS WITH TRAILING STOPS, 1972-1977

Box Size in $/cwt.	Reversal Distance in Boxes	Size of Stop in $/cwt.	Net Profits from Long Trades	Net Profits from Short Trades	Total Net Profits	Total Number of Trades	Percent Profitable Trades	Percent of Trades Stopped Out
.05	5	1.45	31,127	28,134	59,261	260	43.1	52.7
.05	5	1.50	31,232	28,667	59,899[a]	259	42.9	49.4
.05	5	1.55	32,453	26,545	59,998	255	44.3	48.6
.15	1	1.35	30,634	27,108	57,742	276	44.6	48.6
.15	1	1.40	31,162	26,864	58,026[a]	273	43.2	45.8
.15	1	1.45	30,990	26,528	57,518	272	43.4	42.3
.20	1	1.35	29,291	27,071	56,362	260	43.8	54.6
.20	1	1.40	30,982	25,895	56,877[a]	256	43.8	51.6
.20	1	1.45	30,524	25,790	56,314	255	44.3	46.7
.20	3	1.40	23,889	19,865	43,754	124	46.8	75.0
.20	3	1.45	23,108	21,619	44,727[a]	119	48.7	71.4
.20	3	1.50	22,982	20,422	43,404	119	47.1	64.7
.40	1	1.40	30,876	22,980	53,967	183	46.4	68.3
.40	1	1.45	32,053	25,566	57,619[a]	178	48.3	63.5
.40	1	1.50	30,751	25,188	55,939	178	46.1	61.8

[a]Denotes maximum total net profits for each box size-reversal number combination.

on either side of the optimal value of the trailing stop for each parameter combination did not greatly reduce the profitability (Table VI).

Summary

Optimized parameter combinations for feeder cattle point and figure charts significantly increased total net profits over the standard $.20 box size and three box reversal. Incorporation of both an ordinary stop and a trailing stop also increased total net profits in most cases although the increase was not ususally substantial. The general pattern which emerged was that the most profitable parameters were the ones most reactive to price changes. Although these reactive parameters generated a large number of trades, they tended to minimize the losses of the unprofitable trades, resulting in a larger total net profit.

The results obtained from this optimization process also indicate that point and figure charts definitely have potential use in the development of selective hedging strategies for feeder cattle. Since there were only slight differences in the total net profits for many of the top parameter combinations both with and without stops, it appears that the hedger seeking a more favorable price may select a parameter combination suited to his own individual preference from a wide variety of feasible parameter combinations.

CHAPTER IV

OPTIMIZATION OF MOVING AVERAGE PARAMETERS FOR THE FEEDER CATTLE FUTURES MARKET

Moving averages are another technical price analysis tool which can assist the feeder cattle hedger in deciding when to place and lift hedges. As with point and figure charting, moving averages are an objective or mechanical device free from the user's emotions or subjective judgments. Moving averages are simple to use, requiring no knowledge of statistics or econometric models, and an inexpensive calculator can handle all the necessary computations. No extensive data is needed since normally only the closing prices of the appropriate feeder cattle futures contract are used in the calculation of the moving averages.

Because of these desirable characteristics, selective hedging strategies based on moving averages should initially appeal to feeder cattle hedgers. However, the real satisfaction from any selective hedging device depends on its ability to aid the hedger in obtaining a more favorable price. It seems desirable, therefore, to extensively examine many various combinations of moving averages to determine the ones which will most likely achieve this goal of a more favorable price.

This chapter involves the optimization of moving average parameters for the feeder cattle futures market. The first part discusses the moving average technique itself. The next part covers the testing procedure used. The results are analyzed in the third section, followed by a summary of the entire chapter.

The Moving Average Technique

Moving averages are a trend-following method of technical price analysis. Trading strategies using moving averages are based on the principle of buying strength and selling weakness.

A moving average of prices is a progressive average in which the number of prices used, as indicated by the divisor, remains the same, but a new price is added to the end of the series at periodic intervals, e.g. daily, as a price is simultaneously dropped from the beginning of the series. Various weighting schemes can also be used in connection with a moving average. A linear weighting scheme consists of giving the oldest price in the series a weight of one, and then adding one to the weight for the next oldest price in the series. This process continues in similar manner with the most recent price having the largest weight which is equal to the number of prices in the moving average. The divisor for a linearly weighted moving average would be the sum of the weights instead of the number of prices in the series.[1]

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[1] To illustrate how a 4-day linear weighted moving is calculated, let t be the day of the most recent closing price. The 4-day weighted moving average is then calculated as follows:

Day	Closing Price	Weight	Product
t	49.00	4	196.00
t-1	48.50	3	145.50
t-2	48.00	2	96.00
t-3	48.00	1	48.00
		10	485.50

The 4-day weight average is 485.50 ÷ 10 = 48.55.

Buy and sell signals are generated by the "crossing action" of the moving averages when more than one time length is used. Technically speaking, the crossing action generates the trading signals even if only one length of moving average is used. If this is the case, the other moving average is implicitly assumed to be a "one-day" moving average, i.e. the daily closing price.

On any day when the shorter length moving average crosses the longer length moving average from above, a downward trend in price is indicated which generates a sell signal. Similarly, when the shorter length moving average crosses the longer length moving average from below, an upward trend in price is indicated, resulting in a buy signal. Figure 7 illustrates the movement and crossing action of two moving averages.

Buy and sell signals are generated in the same manner when three moving averages are used. In Figure 8 a buy signal is indicated when the 4-day weighted leads the 5-day, and the 5-day is above the 10-day. The responsive 4-day weighted moving average confirms the crossing action of the other two moving averages, and thus eliminates some of the false signals. A sell signal is generated when the 4-day weighted is below the 5-day which must also be below the 10-day.

An important trade-off is involved in determining the length of time to use in computing the moving averages. The shorter the length of time, the more sensitive the moving average will be to any change in the price trend. New positions will be established quicker. However, the shorter the length of the moving average, the larger the number of trades that will be made. This results in a greater number of whipsaw losses and more commission expense. A longer length of time used to

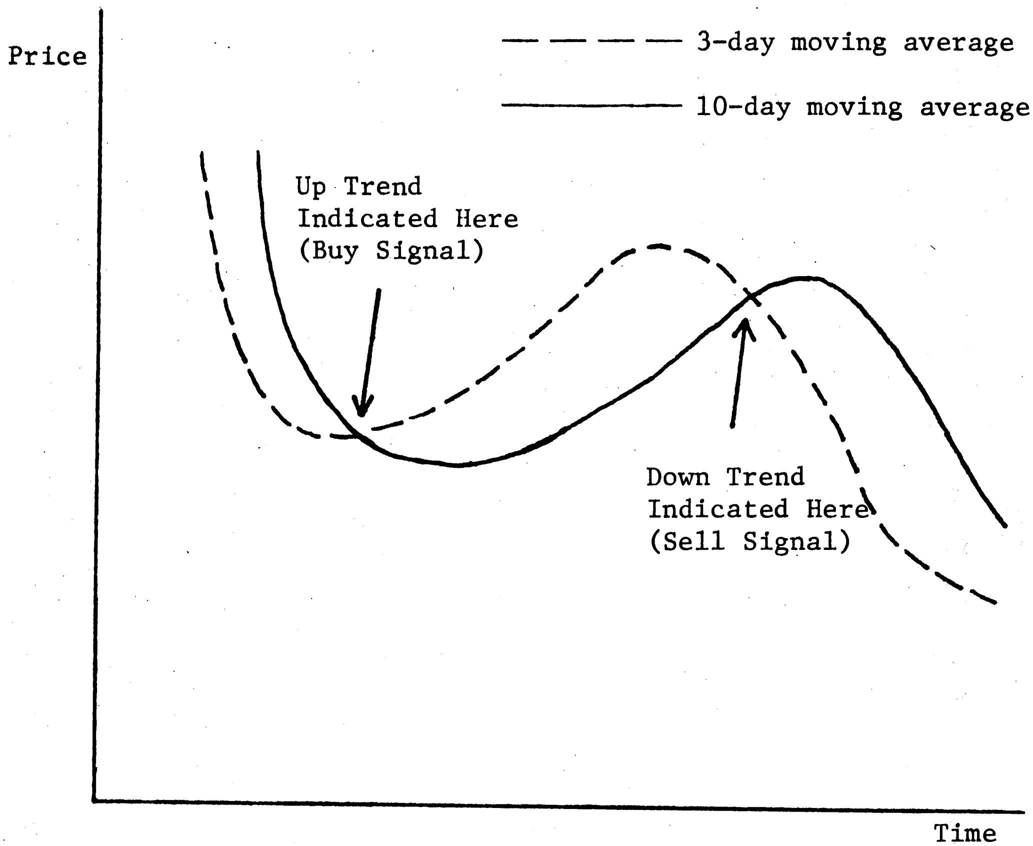

Figure 7. Illustration of Crossing Action of Two Moving Averages

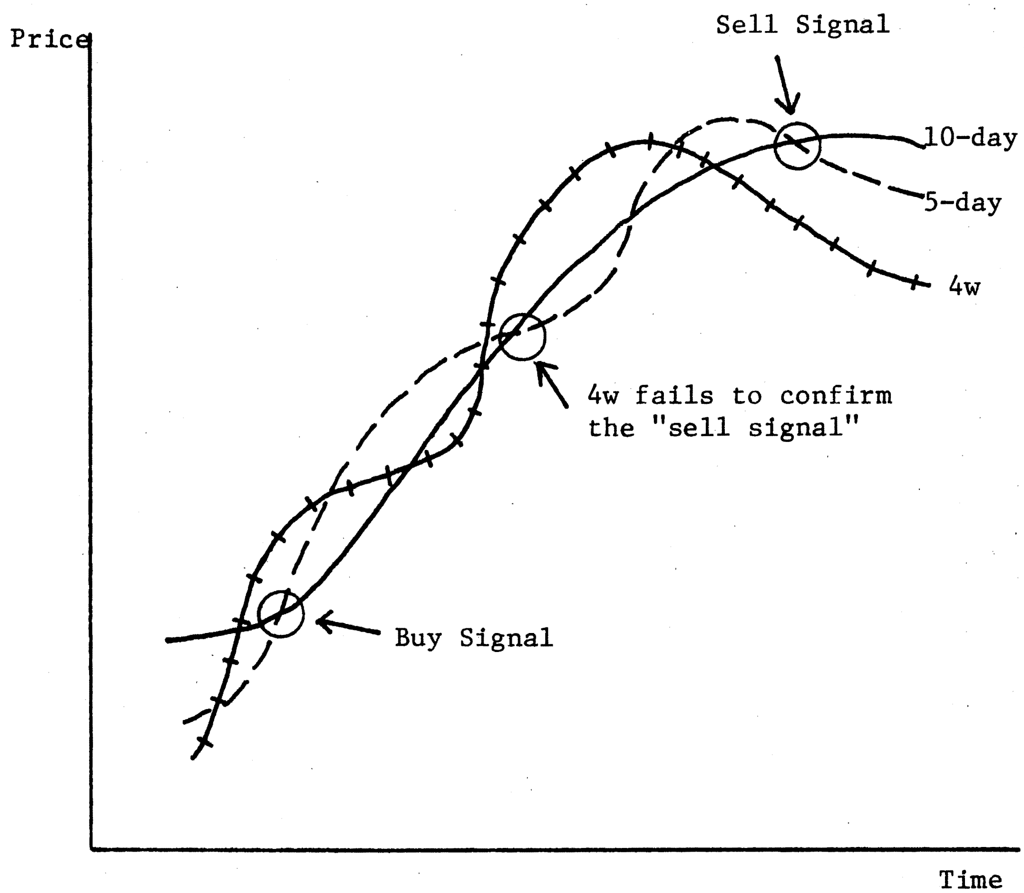

Figure 8. Illustration of Buy and Sell Signals from Three Moving Averages

calculate the moving average will decrease the number of trades and whipsaw losses but will be slower to signal changes in price trends. In this case, much of the price move can already occur before a change in trend is signaled.

A penetration rule can be used to reduce the number of false signals. For instance, waiting for the moving averages to cross or penetrate each other by $.05 or more per cwt. would eliminate some of the whipsaw losses. A penetration rule is subject to the same limitations as described earlier. Too small a penetration will do little towards reducing the number of false signals. Too large a penetration will decrease the profits on the successful signals.

The successfulness of moving averages will depend largely upon the lengths of time used in calculating the moving averages as well as the amount of penetration required. The remainder of this chapter will be devoted to the task of determining the optimum moving average parameters.

Procedure

The same basic procedure used to optimize the point and figure chart parameters was also used in optimizing the moving average parameters. The same 18 feeder cattle contracts were used. The size of the open position was limited to only one 42,000 pound contract for each delivery month at any point in time. The closing prices were used to calculate the moving averages, and trades were transacted on the same day the moving averages crossed.

For this optimization process, optimal was defined as that combination of moving average parameters yielding the highest profits for the entire set of 18 contracts, after charges for commission of

$50.00 per trade. No charges were deducted for interest on margin money. As stated in the previous chapter, this definition of optimality was considered to be the most consistent for a selective hedger with a primary objective of a more favorable price.

Since no formal theory exists on the optimization of moving average parameters, a systematic search procedure was employed. Because of the infinite number of possible moving average combinations, no guarantee exists that the most profitable combination was even tested. However, each of the most promising combinations was varied only slightly in repetitive tests until increases in the total net profit figure could not be obtained.

To keep this trading simulation realistic, certain trading rules were imposed:

1. No trades were transacted on days when the high and low prices were equal, assuming no trading occurred for this contract on this day.

2. No trades were transacted on days when the closing price was up or down the daily limit.

3. Due to the threat of delivery, no new buy signals were honored after the first of the delivery month.

Use of these rules substantially reduced the amount of total net profit as was the case with the point and figure charts.

Analysis of Results

Three basic variations using moving averages were tested: single moving averages and combinations of two and three moving averages. Penetration rules and a linear weighting scheme were also tested with certain selected moving average combinations.

The results of the single moving averages are contained in Table VII. Not surprisingly, only about one third of the total number of trades were profitable without using any penetration rule with these single moving averages. In all cases, the net profits from the long trades were always greater than the net profits from the short trades. The 14-day moving average had the highest total net profits while the most profitable linearly weighted moving average was the 15-day weighted average.

The linearly weighted moving averages were more reactive to price changes as indicated by the increased total number of trades; however, there was also a corresponding increase in the number of false signals. As a result of the trade-off between sensitivity and the number of false signals, the differences in total net profits were not significantly large between the weighted and non-weighted single moving averages.

Minimum penetrations of \$.05 and \$.10 per cwt. were tested with the 14-day and 15-day weighted moving averages (Table VII). Although the percent of profitable trades was increased somewhat, the total net profits of only the 14-day moving average were increased.

On the basis of total net profits, the single moving averages did not perform that poorly. It was evident, however, that decreasing the number of false signals would do the most to increase total net profits. The most obvious method to correct this problem was to include another moving average.

Table VIII contains the results of various combinations of two moving averages. As expected, the percentage of profitable trades was increased by combining two moving averages, and the total number of trades was generally reduced. As a group, the total net profits were

TABLE VII

NET PROFITS IN DOLLARS FROM THE FEEDER CATTLE FUTURES MARKET USING A SINGLE MOVING AVERAGE, 1972-1977

Length of Moving Average[a]	Net Profits from Long Trades	Net Profits from Short Trades	Total Net Profits	Total Number of Trades	Percent Profitable Trades
12	23,405	15,714	39,119	307	34.5
13	22,177	15,115	37,292	296	33.8
14	26,900	18,859	45,759	286	34.3
15	27,414	17,471	44,885	275	34.2
16	24,965	16,431	41,396	266	33.8
12w	23,487	18,034	41,521	379	31.9
13w	23,805	18,776	42,581	353	32.9
14w	24,772	16,536	41,308	340	34.4
15w	25,882	17,053	42,935	323	35.3
16w	22,626	15,634	38,260	311	34.7
14 (.05)	29,015	19,809	48,824	252	38.1
14 (.10)	27,663	18,150	45,813	231	39.0
15w (.05)	25,481	15,854	41,335	292	37.0
15w (.10)	24,131	14,786	38,917	265	38.1

[a]Length is in days. W denotes a linearly weighted moving average. The number in parentheses is the minimum penetration required.

TABLE VIII

NET PROFITS IN DOLLARS FROM THE FEEDER CATTLE FUTURES MARKET USING A COMBINATION OF TWO MOVING AVERAGES, 1972-1977

Lengths of Moving Averages[a]	Net Profits from Long Trades	Net Profits from Short Trades	Total Net Profits	Total Number of Trades	Percent Profitable Trades
3-10	24,536	17,864	42,400	268	40.3
4-10	24,555	19,827	44,382	256	43.4
5-10	24,635	19,646	44,281	256	51.4
6-10	23,672	18,473	42,145	271	41.3
3-9	23,855	18,918	42,773	287	40.1
4-9	25,568	22,196	47,764	280	42.5
5-9	25,534	22,310	47,844	279	41.6
6-9	20,127	16,906	37,033	311	41.2
3-8	24,883	19,485	44,368	306	38.6
4-8	28,402	23,927	42,329	300	42.0
5-8	24,232	20,471	44,703	325	38.0
3-7	25,179	17,358	42,537	337	37.7
4-7	27,689	19,742	47,431	349	38.4
5-7	20,458	13,615	34,073	397	37.8

[a]Length is in days.

also increased relative to the single moving averages.

In Table VIII, the combinations of moving averages were grouped according to each of the longer length moving averages from 10 days down to 7 days. It should be noted that the 4-day lead moving average produced the highest percentage of profitable trades in each group. Total net profits were also the highest with the 4-day lead moving average except in the case of the 9-day group where the 5 and 9-day moving average combination was better by only $80. The 4 and 8-day combination was the most profitable one in Table VIII.[2] Its total net profits were nearly $6,000 greater than the 5-9 combination, the second most profitable combination. The performance of the 3-10 combination which is reported by commodity wire services could be classified as below average or average at best when compared with the other combinations in Table VIII.

The more promising combinations of two moving averages were also tested with a linear weighting technique which weighted the most recent prices the heaviest. With a 4-day lead moving average, weighting the longer moving average was always superior on the basis of total net profits to weighting the 4-day average (Table IX). However, for the 5-9, 5-10, and 3-10 combinations, weighting the shorter moving average was superior to weighting the longer moving average. Weighting the shorter moving average always reduced the total number of trades while weighting the longer moving average always increased the number of trades when compared with the same non-weighted combinations in Table VIII. No other generalizations were apparent.

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[2] Notice that eight is a multiple of four. This could indicate that a simple harmonic relationship is involved.

TABLE IX

NET PROFITS IN DOLLARS FROM THE FEEDER CATTLE FUTURES MARKET USING A COMBINATION OF TWO MOVING AVERAGES WITH LINEAR WEIGHTS, 1972-1977

Lengths of Moving Averages[a]	Net Profits from Long Trades	Net Profits from Short Trades	Total Net Profits	Total Number of Trades	Percent Profitable Trades
4-7w	28,974	19,921	48,895	483	46.6
4-8w	32,267	23,792	56,059	373	44.0
4-9w	28,026	23,098	51,124	332	42.8
4w-7	24,688	17,565	42,253	320	38.1
4w-8	25,321	21,107	46,428	288	41.0
4w-9	26,154	23,030	49,184	269	40.1
3-8w	23,160	18,515	41,675	367	37.3
4w-8w	24,570	19,415	43,985	313	39.3
4-8w	5,698	177	5,875	546	43.6
5-9w	19,240	15,160	34,400	374	42.2
5w-9	25,456	21,690	47,146	268	39.9
5-10w	22,344	17,025	39,369	313	41.9
5w-10	26,723	20,853	47,576	240	43.3
3-10w	24,346	17,217	41,563	305	38.4
3w-10	26,824	21,366	48,190	262	40.1

[a]Length is in days. W denotes a linearly weighted moving average.

The 4-day and 8-day weighted combination was clearly the most profitable (Table IX). The next most profitable combination, the 4-9w combination, had almost $5,000 less total net profits.

Purcell (1977) found that including a reactive third moving average as a lead price trend indicator reduced some of the false signals and increased total net profits in the live cattle futures market. Combinations of this type are reported in Table X. The 4-9-18 day combination used by one chart service for all their commodities performed rather poorly over this six year simulation period for feeder cattle. The 4w-5-15 and 4w-5-10 combinations used by Purcell (1977, 1978) for live cattle and feeder cattle respectively were clearly superior to the 4-9-18 combination on the basis of total net profits.

Adding a shorter length moving average to the 5-10, 4-8, and 4-8w combinations decreased the total number of trades significantly, but increased the percent of profitable trades only slightly (Table X). As a result, the only three moving average combination having greater total net profits than its two moving average counterpart was the 3-4-8w combination.

A penetration rule was also tested to determine its effectiveness in reducing false signals and increasing total net profits. Specifying a minimum penetration always reduced the total numbers of trades but usually resulted in only small increases in the percentage of profitable trades (Table XI). Increases in profits were not always substantial either. In fact, total net profits were decreased significantly when only a $.01 per cwt. minimum penetration was specified for the 3-4-8w combination (Table X). Only a small increase in total net profits was

TABLE X

NET PROFITS IN DOLLARS FROM THE FEEDER CATTLE FUTURES MARKET USING A COMBINATION OF THREE MOVING AVERAGES, 1972-1977

Lengths of Moving Averages[a]	Net Profits from Long Trades	Net Profits from Short Trades	Total Net Trades	Total Number of Trades	Percent Profitable Trades
4-9-18	17,615	6,012	23,627	132	45.5
4w-5-15	24,579	12,369	36,948	160	50.6
4w-5-10	23,038	18,279	41,316	202	43.1
4-5-10	23,443	16,639	40,082	216	43.1
3-5-10	22,635	16,180	28,815	208	44.2
2-4-8	24,817	21,088	45,905	241	44.0
3-4-8	28,175	23,380	51,555	253	43.1
3w-4-8	26,404	22,499	48,903	238	44.5
4w-4-9	26,496	22,767	49,263	235	45.1
2-4-8w	25,156	18,730	43,886	234	43.6
3-4-82	32,019	25,334	47,353	260	44.6
3w-4-8w	28,263	22,460	50,723	233	45.1
4w-4-8w	28,217	22,589	50,806	230	45.7
3-4-8w (.01)	30,275	22,712	52,987	254	44.9

[a]Length is in days. W denotes a linearly weighted moving average. The number in parentheses is the minimum penetration required in $/cwt.

TABLE XI

NET PROFITS IN DOLLARS FROM THE FEEDER CATTLE FUTURES MARKET USING SELECTED MOVING AVERAGES WITH A PENETRATION RULE, 1972-1977

Lenghts of Moving Averages[a]	Minimum Penetration Required	Net Profits from Long Trades	Net Profits from Short Trades	Total Net Profits	Total Number of Trades	Percent Profitable Trades
3-10	.03	25,427	18,814	44,241	249	43.0
3-10	.04	25,650	18,700	44,350	248	42.7
3-10	.05	25,266	19,060	44,326	241	42.7
4w-5-10	.01	24,011	18,622	42,633	198	43.4
4w-5-10	.02	23,994	18,717	42,711	193	44.0
4w-5-10	.03	23,710	18,434	42,144	183	45.4
4-8	.04	29,614	24,286	63,900	268	42.2
4-8	.05	29,845	24,517	54,362	268	42.5
4-8	.06	28,440	23,217	51,657	256	41.8
4-8w	.04	32,087	24,761	56,848	288	44.1
4-8w	.05	33,828	26,405	60,233	276	44.6
4-8w	.06	32,820	25,291	58,111	254	45.3

[a]Length is in days. W denotes a linearly weighted moving average.

obtained when a \$.02 per cwt. penetration rule was used with the 4w-5-10 combination (Table XI). It appears that a penetration rule has rather limited usefulness when working with combinations of three moving averages.

The 4-8w combination was definitely helped the most by the penetration rule from the standpoint of both profits and number of trades. The \$.05 per cwt. minimum penetration increased total net profits by over \$4,000 and reduced the total number of trades by 23 percent from 373 to 276 (Table XI). This evidence seems to indicate that a penetration rule improves the performance most of the more reactive or sensitive combinations which tend to generate a rather large number of trades, e.g. combinations using a linear weighting scheme on the longer moving average.

While the purpose of a penetration rule is to increase total net profits by reducing the number of false signals, profits can also be increased by reducing the dollar loss of the unprofitable trades. An ordinary stop based on the entry price of a trade and a trailing stop based on the previous day's closing price were tested in an attempt to keep losses small on the losing trades. However, both of these stop loss techniques caused an increase in the total number of trades, increased the number of whipsaw losses, and thus substantially reduced the total net profits. Due to the lack of promising results, further refinements of stop loss rules were not examined.

It is important to point out that most of the profits generated from the moving average trading schemes were not confined to a single, unusual year. Table XII presents the yearly distribution of profits from various moving average combinations. Yearly profits were above

TABLE XII

YEARLY DISTRIBUTION OF PROFITS IN DOLLARS FROM SELECTED COMBINATIONS OF MOVING AVERAGES, 1972-1977

Combination[a]	1972	1973	1974	1975	1976	1977	Average
4-8w (.05)	3,150	10,865	14,497	8,037	13,249	10,435	10,039
14	3,036	12,786	11,730	5,346	13,772	-911	7,627
3-10	3,242	9,041	7,689	4,583	14,644	3,201	7,067
4w-5-10	1,132	10,596	5,645	8,608	11,128	4,207	6,886

[a]W denotes a linearly weighted moving average. The number in parentheses is the minimum penetration required.

average in at least three of the years for each combination. The profits from the 4-8w combination with a $.05 minimum penetration rule were distributed extremely well.

Summary

The 4-day and 8-day linearly weighted moving average combination with a $.05 minimum penetration rule had considerably greater total net profits than any other tested moving average combination. However, there were many combinations which had substantially higher profits than the conventional 3 and 10-day combination.

When used separately, both the penetration rule and the addition of a shorter length third moving average increased total net profits of combinations which were more reactive to price changes. Increases in profits were considerably smaller with the less reactive moving average combinations. Improvements of any kind were not obtained from the use of either an ordinary stop or a trailing stop.

The results from this optimization process definitely indicate the potential usefulness of moving averages in the development of a selective hedging strategy for feeder cattle. It seems apparent that moving averages should be quite helpful in determining the proper time to place and lift the hedge for a feeder cattle hedger whose primary goal is a more favorable price. The results of short and long hedging strategy simulations based on both point and figure charts and moving averages will be presented in the next two chapters.

CHAPTER V

TESTING ALTERNATIVE SHORT HEDGING STRATEGIES FOR FEEDER CATTLE

As mentioned in the first chapter, indications in 1978 point to higher feeder cattle prices for the next several years. However, upward trending feeder cattle prices will not eliminate the high level of risk faced by the feeder cattle producer. Higher feeder cattle prices will also mean higher prices for stocker calves which will substantially increase operating expenses. Furthermore, it is not likely that feeder cattle prices will be as stable as in the period from the mid-1960's through 1971. Seasonal supply and demand for feeder cattle coupled with variable weather conditions, fluctuating grain prices, and other factors can result in sizeable short run price declines. Therefore, even upward moving feeder cattle prices do not guarantee that profits will always be made from producing feeder cattle.

When feeder cattle prices become relatively high, many feeder cattle producers feel that any marketing strategy will reap large profits. Past evidence clearly shows that this is not always the case. Many producers received over $50 per cwt. for their feeder cattle in the spring and early summer of 1973. With a very optimistic attitude, many of these producers paid in excess of $70 per cwt. for stocker calves that fall only to receive $35 or less per cwt. for their feeder cattle in the spring of 1974. Needless to say, losses were huge. If there is nothing else positive from this experience, it did teach the feeder cattle producer that he must become more concerned about his marketing strategy.

The feeder cattle futures market is one avenue open to the feeder cattle producer in developing a marketing strategy. A feeder cattle futures contract is guaranteed by the Chicago Mercantile Exchange clearing house, so it is safer than a cash forward contract which has no such guarantee in case the other party reneges. A futures contract is also more flexible than a cash forward contract. After being purchased, the futures contract may be liquidated at any time through an offsetting transaction. This feature allows the holder of a futures contract to cancel his committment to avoid potential losses from adverse futures market price movements. Once a cash forward contract is signed, the committment cannot be offset or eliminated.

The producer is liable in case of unexpected death losses with a cash forward contract since delivery is mandatory. The holder of a futures contract never needs to worry about default because delivery is not mandatory; the futures contract can simply be liquidated. These characteristics plus the accessibility of the feeder cattle futures market make it one of the most useful marketing tools available to feeder cattle producers.

No other marekting device has as much potential as the feeder cattle futures market in helping the producer obtain a more favorable price. An effective selective hedging strategy can substantially increase the profits of a feeder cattle operation. The problem is developing such a strategy which will protect against price declines without forfeiting the profits of an upward moving market.

In this chapter, the knowledge and results from the optimization of the point and figure chart and moving average parameters will be applied and combined with various production situations to determine the usefulness of selective hedging strategies based on these technical tools. The method of analysis, production alternatives, and results of the various hedging strategies will all be covered in this chapter.

Method of Analysis

Three basic production situations representative of Northcentral and Northwestern Oklahoma were simulated to test the alternative hedging strategies. The costs and revenues using actual cash prices were simulated over a six-year period beginning in November, 1971, and ending in October, 1977, for each of the three production alternatives. A total of eight hedging strategies were tested with each production alternative. The stream of net returns from the production activities was combined with the futures market profits from each of the hedging strategies to arrive at a combined average return and standard deviation figure for each alternative.

The following costs were used for the production simulations:

1. A 400 to 500 pound choice stocker steer at Oklahoma City at the average weekly price for these calves.

2. Operating inputs including hay, protein supplement, starter feed, salt, vet and medicine, trucking, sales commission, and other miscellaneous expenses, plus labor costs and the ownership costs of machinery and equipment. The amounts and prices for these items were taken directly from enterprise budgets prepared by the Area Farm Management Extension Specialists in Northcentral and Northwestern Oklahoma.

3. Interest on the operating costs in (1) and (2) at the interest rates indicated in the enterprise budgets.

4. Commission and interest on the initial margin requirement for a feeder cattle futures contract. A commission charge of $50 per trade was subtracted from the returns. An $800 initial margin requirement was used. The same interest rates used in (3) were also used to calculate the interest charges on the margin requirement.

No charges were assessed for grazing in these simulations. All operating expenses were adjusted upward to reflect a 2 percent death loss.

The income came from the sale of the feeder steers at the end of the production period. This revenue was computed from the average weekly price of choice feeder steers in Oklahoma City for the appropriate weight class during the week the steers were sold. The number of steers produced in each production situation was varied so that the total final weight of the feeder steers would be 42,000 pounds, the size of one feeder cattle futures contract.

Production Alternatives

The first production alternative simulated the situation where stocker calves are bought in the fall and grazed on small grains pasture only until the middle of March. This simulation corresponds with a farmer planning to harvest the grain. Seventy-four 400 pound stocker steers are purchased during the week of November 15 and sold at a weight of 565 pounds during the week of March 15 for an average daily gain of 1.35 pounds. The March feeder cattle contract is used for hedging.

This procedure is repeated for each of the six years. All three production alternatives will have six observations.

With the second production alternative, the feeder steers are allowed to graze-out the small grains pasture. Sixty-two stockers weighing 400 pounds are bought during the week of November 15 and sold during the week of May 15 weighing 678 pounds. Average daily gains are assumed to be 1.35 pounds from November 15 to March 15 and 1.85 pounds from March 15 to May 15. The May contract is used for hedging the feeder steers.

The final production alternative is a summer stocker simulation. Sixty-one 500 pound stocker steer calves are purchased on May 1 and are sold on October 1 weighing 690 pounds. An average daily gain of 1.25 pounds is assumed during this five-month period. The October contract is used for hedging.

Criteria Used to Compare Hedging Strategies

The average net return and standard deviation of net returns in dollars per head are calculated for each of the alternative production and hedging strategy combinations. The average net return is a measure of the profitability of each hedging strategy. The standard deviation is a measure of the variability of the six net returns. It serves as a comparison of risk among the various hedging strategies. It is a relative measure and not an absolute measure of risk.

The coefficient of variation is another measure used to compare the strategies. It is the standard deviation expressed as a percentage of the average return. It also measures the variability of the six net returns but is adjusted for the size of the average return. For example, if two average returns of $10 and $50 per head both have a standard deviation of $5, the coefficient of variation for the $10 average return will be 50 percent but only 10 percent for the $50 average return.

Three absolute measures were reported to aid comparison among the various hedging strategies. These measures were the low return, the high return, and the total number of trades or hedges placed during the six production periods.

Hedging Strategies

The same trading rules and sell and buy signals used in the optimization procedures were used to place and lift, respectively, the short hedges. The hedges could be placed during the production period only. Since the expected production was equal to 42,000 pounds for each of the production situations, the size of the open position was limited to one feeder cattle futures contract.

Strategy 1

No hedging was done with this strategy. Its results correspond to the production activity only. It serves as a benchmark to compare the effectiveness of the other strategies. The net returns from the other alternatives are obtained by adding the net returns from Strategy 1 to the futures profits resulting from the alternative hedging strategies.

Strategy 2

Strategy 2 is a nonselective hedging strategy. A hedge is placed at the beginning of the production process and lifted when the feeder steers are sold. This strategy will increase profits only if the futures price at the beginning of the production period is greater than at the end of the production period. However, this strategy should considerably reduce the variability of the flow of net returns. Losses in the futures market should be offset by higher cash prices. Likewise, profits should be made in the futures market if the cash price for feeder steers declines.

Strategy 3

This is a selective hedging strategy based on the 3 and 10-day moving averages. The crossing action of the moving averages determines when to place and lift the hedge. The hedge is placed whenever the shorter 3-day moving average crosses the longer 10-day moving average from above. The hedge is lifted whenever the 3-day moving average crosses the 10-day moving average from below. Therefore, the hedge can be placed and lifted several times during the production period.

Theoretically, a selective hedging strategy should protect the feeder cattle producer from a price decline and also allow the benefits of upward moving cash prices. The 3 and 10-day combination was selected for testing since it is reported by the commodity news wire.

Strategy 4

This selective hedging strategy is similar to Strategy 3 except that the 4-day linearly weighted, 5-day, and 10-day moving average combination is used instead of the 3-10 combination. The 4w-5-10 combination was selected for testing since it was the most profitable one reported by Purcell (1978) for hedging feeder cattle.

Strategy 5

The 4-day and 8-day linearly weighted moving averages with a $.05 per cwt. minimum penetration rule are used to place and lift hedges with this strategy. This moving average combination produced the highest net profits from the short trades in the optimization procedure presented in Chapter IV.

Strategy 6

Strategy 6 uses the point and figure charting method of technical price analysis to hedge selectively. Breakouts of the double bottom and top formations are used to place and lift the hedges, respectively. This particular strategy is based on the commonly used $.20 box size and three box reversal.

Strategy 7

A $.40 box size and a one box reversal point and figure chart with a $1.45 trailing stop is used for Strategy 7. The $.40 x 1 parameter combination is used by one chart service for live cattle. The $1.45 trailing stop was included since it increased net profits from the short trades more than any other stop or trailing stop tested with the $.40 x 1 combination in the optimization study.

Strategy 8

Strategy 8 is based on a $.05 x 5 point and figure chart with a $1.50 trailing stop. This parameter combination had the highest net profits from the short trades of any combination tested in the optimization process in Chapter III.

Comparison of the Alternative Hedging Strategies

Tables XIII, XIV, and XV present the summary statistics for the eight alternative hedging strategies for each of the three simulated production alternatives. Changes in the average return per head and the standard deviation of returns relative to the "no hedge" strategy, Strategy 1, are also shown in the tables.

The Small Grains Grazing Production Alternative (Table XIII)

Strategies 7 and 8 more than doubled the average return per head over the "no hedge" strategy. All six of the selective hedging strategies, Strategies 3 through 8, substantially increased average returns and greatly reduced the variability of returns (as shown by the change in the standard deviation) when compared to Strategy 1. As expected, the "hedge and hold" strategy had the lowest standard deviation, but it also significantly reduced the average return per head.

The low returns were greatly increased with any of the hedging strategies. Strategies 5 and 8 even had positive low returns. The high return for the six production periods was decreased by all the hedging strategies, but only slightly with the point and figure chart strategies.

As a group, the point and figure chart strategies did a better job of increasing average returns than the moving average strategies. However, the moving averages were superior to the point and figure charts on the basis of decreasing variability. Using the coefficient of variation for comparison, there was little difference between the

TABLE XIII

RESULTS OF SIMULATED SHORT HEDGING STRATEGIES FOR THE SMALL GRAINS GRAZING PRODUCTION ALTERNATIVE IN DOLLARS PER HEAD, 1972-1977

Strategy	Average Return	Change in Returns from Strategy 1	Standard Deviation of Return	Change in Standard Deviation from Strategy 1	Coefficient of Variation	Low Return	High Return	Number of Trades
1. No Hedge	13.20	--	50.13		379.9%	-69.03	85.04	0
2. Hedge & Hold	4.67	-8.53	13.92	-36.21	298.5%	-16.15	24.28	6
3. 3-10	21.64	+8.44	20.76	-29.37	95.9%	-1.80	48.75	23
4. 4w-5-10	22.04	-8.84	23.70	-26.43	107.5%	-0.19	60.71	18
5. 4-8w ($.05)	21.67	+8.47	16.63	-33.50	76.7%	2.16	43.54	23
6. .20x3	23.75	+10.55	28.80	-21.33	121.3%	-1.02	78.41	14
7. .40x1 ($1.45T)	29.06	+15.86	27.93	-22.20	96.1%	-1.98	78.12	15
8. .05x5 ($1.50T)	30.97	+17.77	22.71	-27.42	73.3%	16.00	76.03	22

moving averages and the point and figure charts.

The Small Grains Graze-Out Production Alternative (Table XIV)

The selective hedging strategies increased average returns from \$14 to \$21 per head over Strategy 1. These increases in returns were also accompanied by sizeable decreases in the standard deviations. Again the "hedge and hold" strategy reduced the variability of returns the most but also caused a reduction in the average return per head.

All the strategies except Strategy 1 had positive low returns. The high returns for the selective strategies were greater than the high return of the "no hedge" strategy. There were no distinct differences between the results of the point and figure chart and moving average strategies. One peculiar result was that the "non-optimal" \$.20 x 3 point and figure chart strategy had a higher average return than either of the other two point and figure chart strategies, Strategies 7 and 8.

The Summer Stocker Production Alternative (Table XV)

This production alternative was helped the most of the three by the hedging strategies, both in an absolute and relative sense when compared with the "no hedge" strategy. Even the "hedge and hold" strategy significantly increased the average return per head. This result is not that unusual when one considers the fact that feeder cattle prices are typically at seasonal highs in the spring and at seasonal lows in the fall.

TABLE XIV

RESULTS OF SIMULATED SHORT HEDGING STRATEGIES FOR THE SMALL GRAINS GRAZE-OUT PRODUCTION ALTERNATIVE IN DOLLARS PER HEAD, 1972-1977

Strategy	Average Return	Change in Returns from Strategy 1	Standard Deviation of Return	Change in Standard Deviation from Strategy 1	Coefficient of Variation	Low Return	High Return	Number of Trades
1. No Hedge	49.10	--	50.80	--	103.5%	-46.48	103.34	0
2. Hedge & Hold	34.62	-14.48	10.08	-40.72	29.1%	21.73	49.76	6
3. 3-10	67.87	+18.88	32.39	-18.51	47.6%	27.84	108.69	34
4. 4w-5-10	67.02	+17.92	37.45	-13.35	55.9%	22.61	118.84	26
5. 4-8w ($.05)	70.54	+21.44	35.64	-15.16	50.5%	28.11	117.30	34
6. .20x3	69.95	+20.85	36.15	-14.65	51.7%	34.94	134.54	18
7. .40x1 ($1.45T)	63.55	+14.45	29.46	-21.34	46.4%	29.59	106.04	22
8. .05x5 ($1.50T)	66.08	+16.98	35.38	-15.42	53.5%	19.85	121.41	29

TABLE XV

RESULTS OF SIMULATED SHORT HEDGING STRATEGIES FOR THE SUMMER STOCKER PRODUCTION ALTERNATIVE IN DOLLARS PER HEAD, 1972-1977

	Strategy	Average Return	Change in Returns from Strategy 1	Standard Deviation of Return	Change in Standard Deviation from Strategy 1	Coefficient of Variation	Low Return	High Return	Number of Trades
1.	No Hedge	1.90	--	53.05	--	2792.2%	-72.73	60.72	0
2.	Hedge & Hold	17.78	+15.88	17.47	-35.58	98.3%	-2.85	35.69	6
3.	3-10	22.89	+20.99	36.08	-16.97	157.7%	-14.63	76.86	31
4.	4w-5-10	21.43	+19.53	36.25	-16.80	169.2%	-17.94	84.01	23
5.	4-8w ($.05)	31.29	+29.39	29.76	-23.29	95.1%	-8.22	79.69	34
6.	.20x3	23.97	+22.07	24.82	-28.23	103.6%	3.20	68.73	19
7.	.40x1 ($1.45T)	27.08	+25.18	27.72	-25.33	102.3%	-14.90	70.10	23
8.	.05x5 ($1.50T)	26.72	+24,82	30.69	-22.36	114.9%	-12.69	58.35	33

Strategy 5, the 4-8w moving average combination with a $.05 minimum penetration rule, gave the largest average return per head and the lowest coefficient of variation although Strategy 6 had the lowest standard deviation of the selective strategies. As a group, the point and figure chart strategies resulted in less variable returns and lower coefficients of variation than the moving averages.

Strategy 6 was the only one having a positive low return, but the low returns of all the strategies involving hedging were substantially improved over the low return of -$72.73 for Strategy 1.

Summary

In every case, the selective hedging strategies increased the average returns per head and reduced the variability of returns when compared with the "no hedge" strategy. Any of the selective hedging strategies was a definite improvement over the "no hedge" strategy on the basis of these criteria. However, selection of the "best" hedging strategy must be left up to each individual hedger and will depend upon his own trade-off between expected returns and risk. A producer whose goal is to maximize profits would want to select the strategy most likely to result in the highest average returns. On the other hand, a producer whose primary concern is to reduce risk might opt for a strategy giving a lower average return in order to reduce the variability or standard deviation of returns. A producer concerned about his cash flow position might want to select the strategy most likely to result in a positive return year after year.

The results of this production and hedging simulation definitely indicate hedging can be an effective management and marketing tool to simultaneously increase profits and reduce risk. A necessary requirement for successful selective hedging is a thorough understanding of the futures markets plus the willingness to stick with the particular hedging strategy chosen. A feeder cattle producer willing to spend the time necessary for a successful hedging program should reap substantial benefits for his efforts.

CHAPTER VI

TESTING ALTERNATIVE LONG HEDGING STRATEGIES FOR FEEDER CATTLE

Rising feeder cattle prices can create both problems and opportunity for the cattle feeder. Higher feeder cattle prices increase operating costs and also increase the risk of financial loss. However, effective use of the long hedge for feeder cattle can substantially improve the profitability of a cattle feeding operation.

Many cattle feeders have discovered the usefulness of a short live cattle hedge during times of downward moving cattle prices which have occurred since late 1973. However, as the liquidation phase of the cattle cycle is completed and expansion is begun, all cattle prices will tend to be trending upward. Desired results from the short live cattle hedge will be more difficult to achieve. As mentioned in the first chapter, the long hedge for feeder cattle may do more to increase profits and reduce risk for the cattle feeder than the short live cattle hedge during the next several years.

In this chapter, various long hedging strategies will be tested to determine their potential ability to take advantage of upward trending prices. The procedure, the strategies, and the results will all be discussed and examined in the remainder of the chapter.

Method of Analysis

Since the year-round cattle feeder continuously needs feeder cattle, he has a "short" cash position and needs to buy or take a "long" position in the feeder cattle futures market to hedge against rising cash prices. Therefore, only long positions were taken in this hedging simulation. Two lengths of planning horizons, a 90-day and a 180-day period, were arbitrarily selected for this analysis. A cattle feeder may want to choose the length of time of the feeding period for his planning horizon. There is no hard and fast rule concerning this decision.

The simulation began on January 1, 1972, and ended on November 14, 1977. A new planning period was started each week. The size of the open position for each period was limited to only one contract, assumed to consist of 65 head of feeder steers weighing approximately 646 pounds. In the earlier years of this simulation, not all the contracts began trading early enough to allow a complete 180-day planning period. When this situation occurred, the hedging strategies were started as soon as the contract began trading.

The March, April, May, August, September, October, and November contracts were used for hedging. The newly created January contract was not used in this study. The month of the ending date of the planning period determined which contract was used. When the ending date fell past the fourteenth of a delivery month, the next contract was used for hedging to avoid taking delivery. Because of the gap between the May and August and the November and March contracts, the August and March contracts were used to place hedges in a proportionately large number of periods.

The same trading rules and signals described in Chapters III and IV were followed to place and lift the long hedges, except that the long trades could be initiated after the first of the delivery month and held until the end of the planning period. An arbitrarily chosen commission fee of $50 per round turn was charged against the futures market profits. A $600 initial margin requirement and a $400 maintenance margin requirement were arbitrarily selected for the simulation period. A margin call was issued anytime the margin money fell below $400 per contract, and enough money was added to the hedging account to replenish the margin money back to $600 per contract. Interest on the margin money was charged at a rate equal to the average annual prime rate charged by banks as reported in the Business Conditions Digest (U. S. Department of Commerce, 1977) plus 2 percent.

The per head net profits from the futures market were subtracted from the cost of a 646 pound feeder steer using the appropriate average weekly cash price for choice 600 to 700 pound feeder steers at Oklahoma City. The average cost per head for each strategy and the standard deviation were calculated to compare the effectiveness of the different strategies in reducing the cost and the variability over the six-year period. The coefficient of variation, a measure of the variability based on the size of the average cost, was also computed for each strategy. However, it should be analyzed in conjunction with the average cost and standard deviation since in this case, a less desireable higher average cost will reduce the size of the coefficient of variation given the same standard deviation. The highest and lowest costs for feeder steers that occurred during the simulation period were also reported for each strategy.

The best and worst dollar positions in the futures market were recorded for both a single contract and multiple contracts held concurrently at any one point in time. The largest quarterly loss and profit in the futures market, based on the dates the trades were completed and not the ending dates of the planning periods, were also computed for each strategy and serve as a proxy measure of the variability and distribution of the profits in the futures market.

Hedging Strategies

A "no hedge" strategy, a nonselective hedging strategy, and six selective hedging strategies based on moving averages and point and figure charts were tested with both the 90-day and 180-day planning periods.

Strategy 1

This is the "no hedge" strategy. It corresponds to the situation of simply buying the feeder cattle at the end of the planning periods. Its average cost is that of a 646 pound choice feeder steer at Oklahoma City over the six-year period. This cash cost is used in the other strategies involving hedging strategies and serves as the basis of comparison among the alternative strategies.

Strategy 2

Strategy 2 is a nonselective hedging strategy. A long hedge is placed at the beginning of the planning period and lifted at the end of each period. It will decrease the cost of feeder steers only if the futures price at the beginning is lower than at the ending date of the period.

Strategy 3

This is a selective hedging strategy based on the 3 and 10-day moving averages. The crossing action of the moving averages determines when to place and lift the hedge. As a result, many hedges may be placed and lifted during the planning period. This moving average combination has been selected for testing since it is reported by the commodity news wire service.

Strategy 4

This strategy is similar to Strategy 3 except the 4-day weighted, 5-day, and 10-day moving average combination is used rather than the 3-10 combination. The 4w-5-10 combination was the most profitable moving average combination tested by Purcell (1978) in a long hedging simulation for feeder cattle.

Strategy 5

Strategy 5 used the optimized moving average combination reported in Chapter IV, the 4-day and 8-day weighted combination with a $.05 per cwt. minimum penetration rule.

Strategy 6

The last three strategies are based on the buy and sell signals generated from the double top and bottom formations of point and figure charts. This particular strategy uses the common $.20 box size and three box reversal.

Strategy 7

Strategy 7 uses a \$.40 box size and a one box reversal parameter combination. These parameters are used by one chart service for their live cattle point and figure chart. A \$1.45 trailing stop was also incorporated into this strategy since it increased profits from the long trades the most in the optimization study using the \$.40 x 1 combination.

Strategy 8

This strategy is based on a \$.15 x 1 point and figure chart and a \$.25 ordinary stop. This particular combination had the greatest profits from the long trades of any combination tested in Chapter III.

Comparison of the Alternative Hedging Strategies

The 90-day Planning Period (Tables XVI and XVII)

Table XVI presents the summary statistics of the futures market results of the various strategies. All the selective strategies contributed from \$8 to over \$10 per head to the feeding profits. The "hedge and hold" strategy resulted in a negative \$1.87 futures profit per head. The amount of interest on the margin money for this strategy was nearly double that for any of the selective strategies.

The number of trades appears to be large for the selective strategies because of the overlap of the 294 planning periods. Using a 90-day planning period and starting a new period each week means

TABLE XVI

SUMMARY OF THE FUTURES MARKET RESULTS OF ALTERNATIVE LONG HEDGING STRATEGIES USING A 90-DAY PLANNING PERIOD, 1972-1977

Strategy	No. of Trades	Interest on Margin Money	Net Profit From Trades[a]	Per Head Net Profit	Worst Single Contract Position	Best Single Contract Position	Worst Multiple Contract Position	Best Multiple Contract Position	Largest Quarterly Loss	Largest Quarterly Profit
1. No Hedge	0	---	----	---	---	---	---	---	---	---
2. Hedge & Hold	294	$10,327	$ -35,671	$ -1.87	$ -7,686	$ 7,362	$ -58,724	$67,741	$ -58,744	$45,898
3. 3 - 10	957	5,343	153,155	8.02	-3,906	7,224	-20,214	67,981	-14,623	37,208
4. 4w-5-10	709	5,281	169,549	8.88	-3,906	7,131	-18,387	67,510	- 8,895	58,367
5. 4-8w (.05)	1,010	5,038	189,210	9.90	-3,906	7,236	-20,214	68,035	-10,662	36,493
6. $.20 x 3	632	5,768	141,179	7.39	-2,184	7,014	-15,161	67,905	-22,281	55,539
7. $.40x1 ($1.45T)	698	5,308	193,306	10.12	-2,225	7,014	- 8,000	67,821	-12,305	49,209
8. $.15x1 ($.25)	1,123	5,152	207,292	10.85	- 840	7,329	- 6,005	67,758	-11,689	44,045

[a]Allows for charges for interest on margin money and a commission of $50 per trade.

TABLE XVII

RESULTS OF SIMULATED LONG HEDGING STRATEGIES USING A 90-DAY PLANNING PERIOD IN DOLLARS PER HEAD, 1972-1977

Strategy	Feeder Steer Average Cost	Change in Avg. Cost from Strategy 1	Std. Dev. of Avg. Cost	Change in Std. Dev. from Strategy 1	Coefficient of Variation	High Cost	Low Cost
1. No Hedge	260.25	--	49.67	--	19.1%	422.58	159.92
2. Hedge & Hold	262.12	+1.87	47.64	-2.03	18.2%	438.82	162.51
3. 3 - 10	252.23	-8.02	46.52	-3.15	18.4%	434.93	169.82
4. 4w-5-10	251.37	-8.88	47.33	-2.34	18.8%	431.00	164.33
5. 4-8w (.05)	250.35	-9.90	46.80	-2.87	18.7%	434.93	162.64
6. $.20x3	252.86	-7.39	45.58	-4.09	18.0%	449.01	167.81
7. $.40x1 ($1.45T)	250.13	-10.12	42.11	-7.56	16.8%	383.82	166.06
8. $.15x1 ($.25)	249.40	-10.85	41.31	-8.36	16.6%	394.80	168.39

that as many as 12 periods could be in various stages of completion at any point in time.

The values of the best single and multiple contract positions were considerably greater than the absolute values of the worst positions for the selective hedging strategies. The worst positions for the point and figure chart strategies were more favorable than those associated with the moving average strategies. However, as a group, the largest quarterly losses were smaller with the moving average strategies.

All six of the selective hedging strategies had lower standard deviations than the "hedge and hold" strategy, a result not usually expected (Table XVII). Furthermore, Strategy 2 was the only one which failed to reduce the average cost. Based on these two criteria, Strategy 2 was clearly inferior to any of the selective hedging strategies.

Only Strategies 7 and 8 had lower "high cost" figures than the "no hedge" strategy. None of the strategies were successful in reducing the low cost below that of Strategy 1. Strategies 5 and 8, which were based on the optimized parameter combinations, produced the lowest average costs. Strategy 8 reduced the average cost for feeder steers to \$294.40 per head or \$38.60 per cwt. The average cost was \$250.35 per head or \$38.74 per cwt. for a 646 pound feeder steer using Strategy 5.

<u>The 180-day Planning Period</u> (Tables XVIII and XIX)

All the selective hedging strategies based on technical price analysis performed very well with net futures profits ranging from

TABLE XVIII

SUMMARY OF THE FUTURES MARKET RESULTS OF ALTERNATIVE LONG HEDGING STRATEGIES USING A 180-DAY PLANNING PERIOD, 1972-1977

Strategy	No. of Trades	Interest on Margin Money	Net Profit From Trades[a]	Per Head Net Profit	Worst Single Contract Position	Best Single Contract Position	Worst Multiple Contract Position	Best Multiple Contract Position	Largest Quarterly Loss	Largest Quarterly Profit
1. No Hedge	0	---	---	---	---	---	---	---	---	---
2. Hedge & Hold	281	$ 20,549	$ 44,945	$ 2.47	$ -8,315	$ 9,156	$ [b]	$ 106,255	$ -62,490	$ 52,135
3. 3 - 10	1,557	9,556	309,298	16.94	-2,927	7,320	-26,350	94,634	-19,083	94,416
4. 4w-5-10	1,146	10,439	306,719	16.80	-2,675	7,161	-26,249	92,945	-20,586	117,245
5. 4-8w (.05)	1,618	8,523	380,186	20.82	-2,927	7,236	-20,214	92,966	-24,610	90,474
6. $.20x3	981	11,201	261,346	14.31	-2,184	7,497	-18,185	94,878	-36,952	112,235
7. $.40x1 ($1.45T)	1,119	10,792	320,675	17.56	-1,049	7,035	-13,439	91,350	-31,194	103,304
8. $.15x1 ($.25)	1,792	10,920	368,088	20.15	- 840	7,434	-13,439	93,597	-32,898	102,463

[a]Allows for charges for interest on margin money and a commission of $50 per trade.

[b]Less than -$100,000.

TABLE XIX

RESULTS OF SIMULATED LONG HEDGING STRATEGIES USING A 180-DAY PLANNING PERIOD IN DOLLARS PER HEAD, 1972-1977

Strategy	Feeder Steer Average Cost	Change in Avg. Cost from Strategy 1	Std. Dev. of Avg. Cost	Change in Std. Dev. from Strategy 1	Coefficient of Variation	High Cost	Low Cost
1. No Hedge	260.69	--	50.74	--	19.5%	422.58	159.92
2. Hedge & Hold	258.22	-2.47	40.58	-10.16	15.7%	374.10	167.14
3. 3 - 10	243.75	-16.94	40.18	-10.56	16.5%	360.14	173.81
4. 4w-5-10	243.89	-16.80	41.63	-9.11	17.1%	357.69	161.20
5. 4-8w (.05)	239.87	-20.82	40.38	-10.36	16.8%	357.29	167.12
6. $. 0x3	246.38	-14.31	40.69	-10.05	16.5%	362.43	168.58
7. $.40x1 ($1.45T)	243.13	-17.56	37.29	-13.45	15.3%	357.78	165.35
8. $.15x1 ($.25)	240.54	-20.15	34.90	-15.84	14.5%	340.39	173.36

$14.31 to $20.82 per head. The "hedge and hold" strategy resulted in a positive $2.47 futures profit per head. As with the 90-day planning periods, interest charges for Strategy 2 were about twice as much compared with any other hedging strategy. Again, the overlap of the 281 planning periods caused a seemingly large number of trades.

The dollar values of the best positions were substantially larger than the absolute values of the worst positions for both single and multiple contracts using the selective hedging strategies. The same relationship was true for the largest quarterly profits and losses. The point and figure chart strategies did a better job of minimizing the adverse futures positions, but the moving average strategies had smaller quarterly losses.

Probably the most unusual result in Table XIX was the standard deviation for the "hedge and hold" strategy. Four of the six selective strategies had a lower standard deviation than Strategy 2 while all six resulted in significantly lower average costs. Based on these two criteria alone, the selective hedging strategies were clearly superior to the "hedge and hold" strategy during this period.

All the selective hedging strategies reduced the high cost by at least $60 per head relative to the "no hedge" strategy. However, none of these strategies were able to reduce the low cost of $159.92 per head obtained with the "no hedge" strategy. It should be pointed out that the high and low cost figures represent only one of the possible 281 planning periods for each strategy.

The 4-8w moving average strategy reduced the average cost of a feeder steer the most to $239.87 per head or $37.12 per cwt. over the six-year period. This average cost is $20.82 per head or $3.22 per cwt. lower than the average cost of Strategy 1. The optimized point and figure chart strategy, Strategy 8, was a very close second with a $240.54 per head average cost which is equivalent to $37.23 per cwt. for a 646 pound feeder steer.

Summary

The selective hedging strategies very effectively reduced the average cost for feeder steers and the standard deviation associated with that cost during the simulation period from 1972 through 1977. These results are especially significant when it is considered that downward trending cattle prices occurred during much of this period. These strategies could greatly benefit the cattle feeder in the years to come as feeder cattle prices begin trending upward. The point and figure charts and the moving averages both did a very good job of signaling the turns in the feeder cattle futures market. Use of either of these technical price analysis tools would have contributed over $20 per head to the profits of the cattle feeding activity throughout this six-year period.

The futures profits from the 180-day planning period were roughly twice those for the 90-day period. This evidence indicates that a relatively long planning period may be more effective in achieving a more favorable price than a shorter planning period. It seems only natural that a longer time period results in more opportunities which can be taken advantage of by an effective selective hedging strategy.

Profits in the cattle feeding business are never so large that the cattle feeder can pass up the opportunity to add to his feeding profits. The long feeder cattle hedge provides such an opportunity to the cattle feeder who is willing to use an effective hedging strategy suited to his own needs.

CHAPTER VII

SUMMARY AND CONCLUSIONS

Volatile feeder cattle prices during the 1970's have dramatically pointed out the importance of the marketing decisions faced by cattle producers. It is doubtful that the stable and well-behaved feeder cattle prices of the 1960's will be experienced again anytime soon. Therefore, the marketing decisions involved with the selling and buying of feeder cattle will continue to be a very important factor affecting the financial condition of the feeder cattle producer and cattle feeder. The benefits and advantages gained from utilizing the latest production technology can be completely offset from the lack of a sound marketing strategy.

The marketing strategy developed by a cattle producer should be based on his goals or objectives. This study assumed a primary goal of profit maximization with reduction of risk as a secondary goal but nonetheless still a very important goal. Hedging in the feeder cattle futures market was the tool selected for obtaining this objective of a more favorable price. It was hypothesized that technical price analysis of the feeder cattle futures market would assist the feeder cattle hedger in determining the optimum time to place and lift hedges, and as a result this would increase profits and reduce the price risk.

The parameters for point and figure charts and moving averages were optimized to obtain maximum net profits from the futures market. The results from the optimization of these technical price analysis tools were then applied to develop selective hedging strategies for feeder cattle. Three common and realistic feeder cattle production situations were simulated to test alternative short hedging strategies, including the "no hedge" strategy. To test various long hedging strategies, 90-day and 180-day planning horizons were simulated for a year-round cattle feeding operation requiring feeder cattle weekly.

Based on the results obtained from the selective hedging strategies, it would be very difficult to reject the hypotheses stated in Chapter I. The selective hedging strategies effectively increased returns and these larger returns were accompanied by lower variability, i.e. less risk, when compared with the "no hedge" alternative.

Generally speaking, the hedging strategies developed from both point and figure charts and moving averages performed equally well. A hedger could select either tool based on his own individual preferences without sacrificing sizeable net returns. Both tools are objective in nature which removes all subjective elements. Furthermore, both are easily understood and simple to use. Neither access to extensive data sources and a computer nor knowledge of econometric models is required.

Moving averages and point and figure charts both work best during times of big sustained price moves. They do not work well in a choppy or sideways market with small moves up and down. Both of these tools will also give false signals during technical price corrections. However, these tools are more flexible than a monthly or quarterly price forecast model. While the forecasts identify long run trends, the technical tools are more responsive and can signal day to day changes in price directions. As a result, they can adjust to new conditions quicker and therefore have an advantage over price prediction models in signaling when to place and lift hedges.

The simulated results clearly indicate that over time, selective hedging is better than not hedging at all on the basis of size and variability of net returns. Although past performance is no guarantee of future results, there is no reason not to expect similar results in the years to come. The hedger should recognize, however, that net returns from each production period will not always be increased by selective hedging, but in the long run the average net return should be higher and less variable. The hedger should also be willing to accept the fact that more than half of the trades signaled by technical price analysis tools will probably be unprofitable. But the results also indicate that the profits will more than offset the losses over time. The selective hedger must be willing to stick with his hedging strategy. The hedger who abuses a selective strategy by failing to honor the signals is playing a guessing game which has hurt so many in the futures market.

One should not assume that the hedging strategies developed for feeder cattle will work just as well for other commodities, even for closely related commodities such as live cattle. Each commodity has its own special characteristics which prevent the transfer of specific hedging strategies among commodities.

Although it was not a primary objective, the results of this study cast further doubt on the relevance of the random walk theory of commodity futures price behavior, at least concerning the feeder cattle futures market. It is unlikely that the size of the profits obtained from the futures market using the mechanical trading devices tested in this study would have occurred if the price fluctuated in a purely random fashion.

Suggestions for Further Research

Other areas of related research appear very promising. Research needs to be done on the use of trend lines with point and figure charts since a properly constructed trend line would eliminate many of the false signals in a sideways market. Specifically, it needs to be determined if the conventional 45° line is best or if some other angle works better. Other rules need to be developed concerning the exact placement of the trend line and under what conditions it should be used. Additional research is also advisable to discover which parameter combinations, if any, are better suited to use in conjunction with trend lines.

More work needs to be done concerning price projections obtained from point and figure charts using horizontal and vertical counts. Questions about the reliability of the forecast and the length of time elpased before the projection is realized need to be answered.

The usefulness of other technical price analysis tools needs to be studied. Such possibilities include oscillators, the Elliot Wave Theory, and bar charts. Research concerning bar chart formations and trend lines should be very promising.

Finally, research similar to that undertaken in this study seems worthwhile for other agricultural commodities, such as hogs, live cattle, wheat, corn, soybeans, etc. Any information which enables the agricultural producer of the 1970's to do a better job of marketing should be very helpful in alleviating many of his crucial problems.

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VITA 2

JERRY DWAYNE LEHENBAUER

Candidate for the Degree of

Master of Science

Thesis: SIMULATION OF SHORT AND LONG FEEDER CATTLE HEDGING STRATEGIES AND TECHNICAL PRICE ANALYSIS OF THE FEEDER CATTLE FUTURES MARKET

Major Field: Agricultural Economics

Biographical:

Personal Data: Born in Okeene, Oklahoma, November 15, 1953, the son of Mr. and Mrs. Merl A. Lehenbauer.

Educational: Graduated from Ames High School, Ames, Oklahoma, in May, 1972; received the Bachelor of Science in Agriculture degree from Oklahoma State University in May, 1976; completed the requirements for the Master of Science degree at Oklahoma State University in July, 1978.

Professional Experience: Graduate research assistant, Oklahoma State University, September, 1976, to May, 1978. Teaching Assistant, Oklahoma State University, September, 1976, to May, 1977.